

ESTIMATE OF QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
110E7700	Remove Drop Inlet Frame and Grate Assembly for Reset	2	Each
320E1200	Asphalt Concrete Composite	500.0	Ton
380E5030	Nonreinforced PCC Pavement Repair	870.8	SqYd
380E5100	Continuously Reinforced PCC Pavement Repair	50.0	SqYd
380E6000	Dowel Bar	764	Each
380E6110	Insert Steel Bar in PCC Pavement	1,582	Each
380E6200	Tie Bar Retrofit, Stitching	100	Each
380E6310	Seal Random Cracks in PCC Pavement	62	Ft
390E0200	Repair Type A Spall	13.0	SqFt
410E2600	Membrane Sealant Expansion Joint	260.0	Ft
460E0700	Joint Nosing Material	8	SqFt
462E0100	Class M6 Concrete	2.0	CuYd
634E0010	Flagging	100.0	Hour
634E0110	Traffic Control Signs	430.0	SqFt
634E0126	Traffic Control for Pavement Repair	12	Site
634E0275	Type 3 Barricade	15	Each
634E0420	Type C Advance Warning Arrow Board	12	Each
634E1215	Contractor Furnished Portable Changeable Message Sign	2	Each
650E9000	Repair Concrete Curb and/or Gutter	114	Ft
670E7000	Reset Drop Inlet Frame and Grate Assembly	2	Each

SPECIFICATIONS

Standard Specifications for Roads and Bridges, 2015 Edition and Required Provisions, Supplemental Specifications and Special Provisions as included in the proposal.

ENVIRONMENTAL COMMITMENTS

The SDDOT is committed to protecting the environment and uses Environmental Commitments as a communication tool for the Engineer and Contractor to ensure that attention is given to avoid, minimize, and/or mitigate an environmental impact. Environmental commitments to various agencies and the public have been made to secure approval of this project. An agency with permitting authority can delay a project if identified environmental impacts have not been adequately addressed. Unless otherwise designated, the Contractor's primary contact regarding matters associated with these commitments will be the Project Engineer. During construction, the Project Engineer will verify that the Contractor has met Environmental Commitment requirements. These environmental commitments are not subject to change without prior written approval from the SDDOT Environmental Office.

Additional guidance on SDDOT's Environmental Commitments can be accessed through the Environmental Procedures Manual found at: <https://dot.sd.gov/media/documents/EnvironmentalProceduresManual.pdf> >

For questions regarding change orders in the field that may have an effect on an Environmental Commitment, the Project Engineer will contact the Environmental Engineer at 605-773-3180 or 605-773-4336 to determine whether an environmental analysis and/or resource agency coordination is necessary.

Once construction is complete, the Project Engineer will review all environmental commitments for the project and document their completion.

COMMITMENT C: WATER SOURCE

The Contractor will not withdraw water with equipment previously used outside the State of South Dakota or previously used in aquatic invasive species waters within South Dakota without prior approval from the SDDOT Environmental Office. Thoroughly wash all construction equipment to prevent and control the introduction and spread of invasive species into the project vicinity.

The Contractor will not withdraw water directly from streams of the James, Big Sioux, and Vermillion watersheds without prior approval from the SDDOT Environmental Office.

Action Taken/Required:

The Contractor will obtain the necessary permits from the regulatory agencies such as the South Dakota Department of Environment and Natural Resources (DENR) and the United States Army Corps of Engineers (USACE) prior to water extraction activities.

Additional information and mapping of Aquatic Invasive Species in South Dakota can be accessed at: <http://sdleastwanted.com/maps/default.aspx>.

COMMITMENT E: STORM WATER

Construction activities constitute less than 1 acre of disturbance.

Action Taken/Required:

At a minimum and regardless of project size, appropriate erosion and sediment control measures must be installed to control the discharge of pollutants from the construction site.

COMMITMENT H: WASTE DISPOSAL SITE

The Contractor will furnish a site(s) for the disposal of construction and/or demolition debris generated by this project.

Action Taken/Required:

Construction and/or demolition debris may not be disposed of within the Public ROW.

The waste disposal site(s) will be managed and reclaimed in accordance with the following from the General Permit for Construction/Demolition Debris Disposal Under the South Dakota Waste Management Program issued by the Department of Environment and Natural Resources.

The waste disposal site(s) will not be located in a wetland, within 200 feet of surface water, or in an area that adversely affects wildlife, recreation, aesthetic value of an area, or any threatened or endangered species, as approved by the Environmental Office and the Project Engineer.

If the waste disposal site(s) is located such that it is within view of any ROW, the following additional requirements will apply:

1. Construction and/or demolition debris consisting of concrete, asphalt concrete, or other similar materials will be buried in a trench completely separate from wood debris. The final cover over the construction and/or demolition debris will consist of a minimum of 1 foot of soil capable of supporting vegetation. Waste disposal sites provided outside of the Public ROW will be seeded in accordance with Natural Resources Conservation Service recommendations. The seeding recommendations may be obtained through the appropriate County NRCS Office. The Contractor will control the access to waste disposal sites not within the Public ROW with fences, gates and placement of a sign or signs at the entrance to the site stating No Dumping Allowed.

COMMITMENT H: WASTE DISPOSAL SITE (CONTINUED)

2. Concrete and asphalt concrete debris may be stockpiled within view of the ROW for a period of time not to exceed the duration of the project. Prior to project completion, the waste will be removed from view of the ROW or buried, and the waste disposal site reclaimed as noted above.

The above requirements will not apply to waste disposal sites that are covered by an individual solid waste permit as specified in SDCL 34A-6-58, SDCL 34A-6-1.13, and ARSD 74:27:10:06.

Failure to comply with the requirements stated above may result in civil penalties in accordance with South Dakota Solid Waste Law, SDCL 34A-6-1.31.

Cost associated with furnishing waste disposal site(s), disposing of waste, maintaining control of access (fence, gates and signs), and reclamation of the waste disposal site(s) will be incidental to the various contract items.

COMMITMENT I: HISTORICAL PRESERVATION OFFICE CLEARANCES

State Historical Preservation Office (SHPO or THPO) concurrence has not been obtained for this project.

Action Taken/Required:

All earth disturbing activities require a cultural resource review prior to scheduling the pre-construction meeting. This work includes but is not limited to: Contractor furnished material sources, material processing sites, stockpile sites, storage areas, plant sites, and waste areas.

The Contractor will arrange and pay for a record search and when necessary, a cultural resource survey. The Contractor has the option to contact the state Archaeological Research Center (ARC) at 605-394-1936 or another qualified archaeologist, to obtain either a records search or a cultural resources survey. A record search might be sufficient for review if the site was previously surveyed; however, a cultural resources survey may need to be conducted by a qualified archaeologist.

The Contractor will provide ARC with the following: a topographical map or aerial view of which the site is clearly outlined, site dimensions, project number, and PCN. If applicable, provide evidence that the site has been previously disturbed by farming, mining, or construction activities with a landowner statement that artifacts have not been found on the site.

The Contractor will submit the cultural resources survey report to SDDOT Environmental Office, 700 East Broadway Avenue, Pierre, SD 57501-2586. SDDOT will submit the information to the appropriate SHPO/THPO. Allow 30 Days from the date this information is submitted to the Environmental Engineer for SHPO/THPO review.

In the event of an inadvertent discovery of human remains, funerary objects, or if evidence of cultural resources is identified during project construction activities, then such activities will immediately cease, and the Project Engineer will be immediately notified. The Project Engineer will contact the SDDOT Environmental Office to determine an appropriate course of action.

The Contractor is responsible for obtaining any additional permits and clearances for Contractor furnished material sources, material processing sites, stockpile sites, storage areas, plant sites, and waste areas that affect wetlands, threatened and endangered species, or waterways. The Contractor will not utilize a site known or suspected of having contaminated soil or water. The Contractor will provide the required permits and clearances to the Project Engineer at the preconstruction meeting.

UTILITIES

The Contractor will contact the involved utility companies through South Dakota One Call (1-800-781-7474) prior to starting work. It will be the responsibility of the Contractor to coordinate work with the utility owners to avoid damage to existing facilities.

Utilities are not planned to be affected on this project. If utilities are identified near the improvement area through the SD One Call process as required by South Dakota Codified Law 49-7A and Administrative Rule Article 20:25; the Contractor will contact the Project Engineer to determine if project changes are necessary to avoid utility impacts.

SCOPE OF WORK

This project consists of On-call mainline Nonreinforced and Continuously Reinforced PCCP Repair. As repairs are identified, the Contractor will be given notification that a repair is needed. On-call repair needs may exceed estimated quantities. Once a repair need is identified, the Contractor will be given notification of the needed repair and the Contractor will have 21 calendar days from the date of notification to fully complete the identified repair.

COORDINATION BETWEEN CONTRACTS

Project No. 6780-124 (TH-90) has been let through the Minnesota Department of Transportation to construct temporary crossovers within the expected project limits of this contract. Work on this contract must be coordinated with the Minnesota Department of Transportation project such that work on this contract does not interfere with the other project. Coordination between these two projects will be the sole responsibility of the Contractor.

ESTIMATED PCCP REPAIR QUANTITIES AND LOCATIONS

Tables for estimated repair quantities and locations have been included in the plans for the Contractor's review. These quantities represent the known pavement repair needs in the Sioux Falls Area. The Department reserves the right to end pavement repair operations at any time in this contract.

Included in the estimated quantities are 9 CRC Expansion Joints on I-90 EB & WB and one CRC Expansion Joint on I-29 NB that need to be removed, joints widened, and new membrane seals installed.

In addition to the above estimates, it is estimated that 200 SqYd of NRC Pavement Repair, 50 SqYd of CRC Pavement Repair, 2 drop inlet replacements, and 100 feet of curb and gutter repair will be needed on varying routes in the Sioux Falls Area. 100 feet of Tie Bar Retrofit, Stitching has been included for use at the discretion of the Engineer. The intent of the above quantity is to repair the pavement distress that occurs between July 1, 2022 and June 30, 2023 and as much of the known pavement distress that currently exists in the Sioux Falls Area. Other repair locations may be added to during the duration of this project.

The actual repair sizes, quantity of insert steel, and dowel bars needed in the field will be determined by the size of the repair needed at the discretion of the Engineer. Payments to re-stock bars that were ordered but not used on this project will not be made.

EXISTING NRC PAVEMENT

The existing pavement in the Sioux Falls Area ranges from 6" – 13" thick NRC and 8" – 12" thick CRC pavement. The Contractor will bid accordingly, and no additional payment based on thickness will be considered.

The aggregate in the existing NRC and CRC Pavement is quartzite.

RESTORATION OF GRAVEL CUSHION

An inspection of the gravel cushion will be made after removing concrete from each pavement replacement area. Areas of excess moisture will be dried to the satisfaction of the Engineer. Loose material will be removed. Each replacement area will be leveled and compacted to the satisfaction of the Engineer.

If additional gravel cushion material is required, the Contractor will furnish, place and compact gravel cushion to the satisfaction of the Engineer at no additional cost to the State.

Cost for this work will be incidental to the contract unit prices per square yard for Nonreinforced PCC Pavement Repair or Continuously Reinforced PCC Pavement Repair.

GRAVEL CUSHION

If quarried ledge rock is used in the Gravel Cushion, a maximum blend of 40% quarried ledge rock will be allowed.

ASPHALT CONCRETE COMPOSITE

500 tons of asphalt concrete composite has been included in the plans to repair damage to interstate shoulders adjacent to PCCP repair locations. It is expected that the Contractor will place traffic control devices on the shoulder adjacent to repair locations to discourage traffic from driving on the shoulder.

NONREINFORCED PCC PAVEMENT REPAIR - GENERAL

New pavement thickness will equal existing pavement thickness ($T_N = T$).

Locations and size (length or width) of concrete repair areas are subject to change in the field, at the discretion of the Engineer, at no additional cost to the state. Payment will be based on actual area replaced.

Existing concrete pavement will be sawed full depth at the beginning and end of the NRCP repair areas. When either the beginning or end of a NRCP repair area falls close to an existing joint or crack, the NRCP repair area will be extended to eliminate the existing joint or crack. Where possible, new working joints will be adjacent to existing working joints.

Saw cuts that extend beyond the repair area will be minimized and filled with a non-shrinkage mortar mix at the Contractor's expense.

Existing concrete pavement in the replacement areas will be removed by the lift out method or by means that minimize damage to the base and sides of remaining in place concrete. Removed material will be removed from within the right-of-way by the end of the workday. Damage to adjacent concrete caused by the Contractor's operations will be removed and replaced at the Contractor's expense.

If the pavement replacement area is entirely on either side of the existing contraction joint, the location of one of the working joints will be at the original location. Any existing dowel bar assemblies/steel bars will be sawed off and removed.

At full roadway width repairs, when specified, a working joint will be reconstructed at both ends of each pavement replacement area as shown in these plans.

Concrete placed adjacent to gravel and asphalt concrete shoulders will be formed full depth to match the width of existing concrete pavement. Asphalt concrete shoulders adjacent to concrete pavement replacements will be repaired with new hot-mix asphalt concrete.

At repair locations where the new working joint is not opposite the existing working joint, the Contractor will place a ¼" preformed asphalt expansion joint material along the longitudinal joint from the existing working joint to the new working joint. The expansion joint material will meet the requirements of AASHTO M33. Cost for this material will be incidental to the contract unit price per square yard for Nonreinforced PCC Pavement Repair.

NONREINFORCED PCC PAVEMENT REPAIR – GENERAL (CONTINUED)

The initial contraction joint sawing will be performed as soon as practical after placement to avoid random cracking.

Joints (longitudinal and transverse) through and around the repair areas will be sawed and sealed in accordance with the details shown in these plans. Refer to Saw and Seal Joints notes.

NONREINFORCED PCC PAVEMENT REPAIR

Concrete will meet the requirements stated in Section 380 of the specifications, except as modified by the following notes:

The fine aggregate will be screened over a one-inch square-opening screen just prior to introduction into the concrete paving mix if required by the Engineer.

The slump requirement will be limited to 3" maximum after water reducer is added and the concrete will contain 4.5% to 7.0% entrained air. The concrete will contain a minimum of 50% coarse aggregate by weight. Coarse aggregate will be crushed ledge rock, Size No. 1 unless an alternative gradation is approved by the Concrete Engineer as part of the mix design submittal. The mix design will contain between 650 and 800 lbs total cementitious material with a fly ash content of 20%. The minimum 28 day compressive strength will be 4,000 psi. The Contractor is responsible for the mix design used. The Contractor will submit a mix design and supporting documentation for approval at least 2 weeks prior to use.

The use of a water reducer at manufacturer's recommended dosage will be required.

Concrete will be cured with white pigmented curing compound (AASHTO M148, Type 2) applied as soon as practical at a rate of 125 square feet per gallon. Concrete will be cured for a minimum of 48 hours before opening to traffic. The 48 hours is based upon a concrete surface temperature of 60°F or higher throughout the cure period. If the concrete temperature falls below 60°F, the cure time will be extended, or other measures taken, at no additional cost to the State. A strength of 3,000 psi must be attained prior to opening to traffic.

Upon placement of the concrete, repair areas will be straight edged to ensure a smooth riding surface and will be textured longitudinally with the pavement by finishing with a stiff broom. Repair areas will then be checked with a 10-foot straight edge. The permissible longitudinal and transverse surface deviation will be 1/8" in 10 feet.

Concrete will be covered with suitable insulation blanket consisting of a layer of closed cell polystyrene foam protected by at least one layer of plastic. Insulation blanket will have an R-value of at least 0.5, as rated by the manufacturer. Insulation blanket will be left in place, except for joint sawing operations, until the 3,000 psi is attained. Insulation blanket will be overlapped on to the existing concrete by 4'. This requirement for covering repair areas with insulation blankets may be waived during periods of hot weather upon approval of the Engineer.

Cost for performing the aforementioned work including sawing and removing concrete, furnishing and placing concrete, sawing and sealing joints, repairing gravel and asphalt concrete shoulders, labor, tools and equipment will be included in the contract unit price per square yard for Nonreinforced PCC Pavement Repair.

STEEL BAR INSERTION (NRCP)

Steel bars will conform to Section 1010.

Locations and quantities of concrete repair are subject to change in the field at the discretion of the Engineer. The Contractor will be responsible for ordering the actual quantity of steel bars necessary to complete the work.

For existing pavement thickness greater than or equal to 10.5" (T >= 10.5"):

The Contractor will insert the steel bars (1½" x 18" epoxy coated plain round dowel bars and No. 11 x 18" epoxy coated deformed tie bars for transverse joints and No. 5 x 24" epoxy coated deformed tie bars for longitudinal joints) into drilled holes in the existing concrete pavement. An epoxy resin adhesive must be used to anchor the steel bar in the drilled hole as per Section 380.3 C.1.

For existing pavement thickness greater than or equal to 8.5" and less than 10.5" (T >= 8.5" and T < 10.5"):

The Contractor will insert the steel bars (1¼" x 18" epoxy coated plain round dowel bars and No. 9 x 18" epoxy coated deformed tie bars for transverse joints and No. 5 x 24" epoxy coated deformed tie bars for longitudinal joints) into drilled holes in the existing concrete pavement. An epoxy resin adhesive must be used to anchor the steel bar in the drilled hole as per Section 380.3 C.1.

For existing pavement thickness less than 8.5" (T < 8.5"):

The Contractor will insert the steel bars (1" x 18" epoxy coated plain round dowel bars and No. 8 x 18" epoxy coated deformed tie bars for transverse joints and No. 5 x 24" epoxy coated deformed tie bars for longitudinal joints) into drilled holes in the existing concrete pavement. An epoxy resin adhesive must be used to anchor the steel bar in the drilled hole as per Section 380.3 C.1.

Steel bars will be inserted in the transverse joint on 18" centers. The first steel bar in the transverse joint will be placed 9" from the edge of the slab closest to centerline. Steel bars will be inserted in the longitudinal joint on 30" centers and will be a minimum of 15" from either transverse joint. A typical one-lane patch 12' wide and 6' long will require 18 steel bars (8 in each transverse joint and 2 in the longitudinal joint). It will be necessary to laterally adjust the location of some of the inserted steel bars when the dimensions above interfere with existing steel bar locations.

A rigid frame or mechanical device will be required to guide the drill to ensure proper horizontal and vertical alignment of the steel bars in the drilled holes.

SAW AND SEAL JOINTS (NRCP)

All longitudinal and transverse joints at concrete repair areas will be sawed and sealed.

Joint sealing will conform to Section 380.3 P.

Longitudinal and transverse joints in urban sections will be sealed with Hot Poured Elastic Joint Sealer. Transverse joints in rural sections will be sealed with Low Modulus Silicone Sealant. Longitudinal joints in rural sections may be sealed with either Hot Poured Elastic Joint Sealer or Low Modulus Silicone Sealant.

Acceptance of the Low Modulus Silicone Sealant and Hot Poured Elastic Joint Sealer will be based on visual inspection by the Engineer.

Cost for sawing and sealing of the longitudinal construction joint and both transverse joints will be incidental to the contract unit prices per square yard for Nonreinforced PCC Pavement Repair.

FRAME AND GRATE REPAIR

Type B frame and grates, as identified by the Engineer, will be removed, collars repaired as needed to reestablish the proper elevation for drainage, and the existing frame and grates will be reset. It is estimated that 1 CuYd of M6 concrete will be required to repair collar and reset the grate.

CONTINUOUSLY REINFORCED PCC PAVEMENT REPAIR

New pavement thickness will equal existing pavement thickness (T_N = T).

Locations and size (length or width) of pavement repair areas are subject to change in the field, at the discretion of the Engineer, at no additional cost to the state. Payment will be based on actual area replaced.

The Engineer will mark the location of the area to be repaired on construction. Where repair crosses both lanes, the passing lane should be repaired first.

Full Lane Width Repair and Partial Lane Width Repair

The Contractor will saw the in place concrete transversely at four locations for each repair area. Two saw cuts will be full depth. The other two saw cuts will be partial depth saw cuts and will be made to a depth just above the in place reinforcing steel and be placed outside of the previous full depth saw cuts. The outside cuts will be a minimum of 6" from the nearest tight crack outside of the patch.

The Contractor will lift out or break out the center section (including reinforcing steel). In the salvaged rebar sections of the repair areas, the use of 30 or 60 pound hammers will be allowed outside of one foot from the newly created header joint. To prevent damage to the joint and surrounding concrete, only light chipping hammers (not exceeding 15 pounds) will be allowed within the last foot adjacent to the newly created header joint to remove the remaining concrete at each end of the repair area, leaving the reinforcing steel in place.

Small Repair – Existing Steel Retained

The Contractor will saw the in place concrete around the periphery of each repair area to a depth of 2" (above the in place reinforcing steel). The cuts will be a minimum of 6" from the nearest tight crack outside of the patch.

Light chipping hammers (not exceeding 15 pounds) will be used to remove the concrete from the repair area, leaving the reinforcing steel in place.

Saw cuts that extend beyond the repair area will be minimized and filled with a non-shrinkage mortar mix at the Contractor's expense.

Care will be taken not to cut, bend or otherwise damage the in place reinforcing steel. Damage to in place reinforcing steel or to in place concrete beyond the repair area will be replaced at the Contractor's expense, to the satisfaction of the Engineer.

The Contractor will remove and dispose of the in place concrete and in place asphalt concrete.

Existing exposed reinforcing steel and concrete faces will be cleaned by sandblasting and compressed air to remove dirt and debris prior to placement of concrete.

Place reinforcing steel according to the notes for REINFORCING STEEL (CRCP) and STEEL BAR INSERTION (CRCP).

Concrete placed adjacent to asphalt concrete shoulders will be formed full depth to match the width of existing concrete pavement. The excavated area of the asphalt concrete shoulder adjacent to repair areas will be filled with asphalt concrete.

CONTINUOUSLY REINFORCED PCC PAVEMENT REPAIR (CONTINUED)

Concrete will not be placed in the repair areas before 12:00pm and should be placed in the late afternoon. Temperature of the concrete at the time of placement will be between 50°F and 90°F. The temperature of the concrete will be maintained above 40°F during the curing period.

Concrete will meet the requirements stated in Section 380 of the specifications, except as modified by the following notes:

The fine aggregate will be screened over a one-inch square-opening screen just prior to introduction into the concrete paving mix if required by the Engineer.

The slump requirement will be limited to 3" maximum after water reducer is added and the concrete will contain 4.5% to 7.0% entrained air. The concrete will contain a minimum of 50% coarse aggregate by weight. Coarse aggregate will be crushed ledge rock, Size No. 1 unless an alternative gradation is approved by the Concrete Engineer as part of the mix design submittal. The mix design will contain between 650 and 800 lbs total cementitious material with a fly ash content of 20%. The minimum 28 day compressive strength will be 4,000 psi. The Contractor is responsible for the mix design used. The Contractor will submit a mix design and supporting documentation for approval at least 2 weeks prior to use.

The use of a water reducer at manufacturer's recommended dosage will be required.

Concrete will be cured with white pigmented curing compound (AASHTO M148, Type 2) applied as soon as practical at a rate of 125 square feet per gallon. Concrete will be cured a minimum of 48 hours before opening to traffic. The 48 hours is based upon a concrete surface temperature of 60°F or higher throughout the cure period. If the concrete temperature falls below 60°F, the cure time will be extended, or other measures taken, at no additional cost to the State. A strength of 3,000 psi must be attained prior to opening to traffic.

Concrete will be covered with suitable insulation blanket consisting of a layer of closed cell polystyrene foam protected by at least one layer of plastic. Insulation blanket will have an R-value of at least 0.5, as rated by the manufacturer. Insulation blanket will be left in place, except for joint sawing operations until 3,500 psi is attained. Insulation blanket will be overlapped on to the existing concrete by 4'. This requirement for covering repair areas with insulation blankets may be waived during periods of hot weather upon approval of the Engineer.

Upon placement of the concrete, repair areas will be straight edged to ensure a smooth riding surface and will be textured longitudinally with the pavement by finishing with a stiff broom. Repair areas will then be checked with a 10' foot straight edge. The permissible longitudinal and transverse surface deviation will be 1/8" in 10'.

Cost for performing the aforementioned work including sawing, chipping and removing concrete, sandblasting, cleaning, furnishing and placing concrete and reinforcing steel, finishing and curing, replacing asphalt concrete shoulders, labor and equipment will be included in the contract unit price per square yard for Continuously Reinforced PCC Pavement Repair.

REINFORCING STEEL (CRCP)

Reinforcing steel will conform to Section 1010.

After removal of the in place concrete and repair of the gravel cushion, new reinforcing steel will be installed. Refer to the CRC Pavement Repair Area layouts for details.

At full lane and partial lane width repair areas:

New longitudinal bars will be lap spliced with the preserved in place longitudinal bars (New bar diameter to match in place bar diameter).

Additional transverse bars will be centered between the in place transverse bars throughout the length of the repair area. The spacing of transverse bars in the completed repair area should be half the spacing of the in place transverse reinforcing steel.

The additional transverse bars will be lap spliced with No. 5 x 24" epoxy coated deformed tie bars inserted 9" into the existing concrete. Drilled holes will be required. Tie bars will be inserted according to the notes for STEEL BAR INSERTION (CRCP).

At full lane width repair areas:

Additional longitudinal bars will be centered between every other set of two spliced longitudinal bars throughout the width of the repair area. These additional bars will extend 9" into the existing concrete on both sides of the repair area. Drilled holes will be required and the additional longitudinal bars will be inserted in accordance with the notes for STEEL BAR INSERTION (CRCP). The additional longitudinal bars will then be lap spliced.

Cost for this work, including reinforcing steel, ties, labor and equipment will be incidental to the contract unit price per square yard for Continuously Reinforced PCC Pavement Repair.

STEEL BAR INSERTION (CRCP)

Steel bars will conform to Section 1010.

Locations and quantities of concrete repair are subject to change in the field at the discretion of the Engineer. The Contractor will be responsible for ordering the actual quantity of steel bars necessary to complete the work.

Longitudinal deformed tie bars will be inserted 9 inches into the in place concrete at the transverse joint and centered between every other set of two spliced longitudinal bars throughout the width of the repair area. Transverse deformed bars will be lap spliced with deformed tie bars which are inserted 9 inches into the in place concrete at the longitudinal joint throughout the length of the repair area. Refer to the notes for REINFORCING STEEL (CRCP). An epoxy resin adhesive must be used to anchor the steel bar in the drilled hole as per Section 380.3 C.1.

Holes drilled into the existing concrete pavement will be located at mid-depth of the slab and true and normal except that in transverse joints, the drilled in longitudinal steel bar angle will be slightly under 90° to allow for centering of the lap splice between existing longitudinal steel.

A rigid frame or mechanical device will be required to guide the drill to ensure proper horizontal and vertical alignment of the steel bars in the drilled holes.

Cost for reinforcing steel (except the inserted No. 5 x 24" epoxy coated deformed tie bars) will be incidental to the contract unit price per square yard for Continuously Reinforced PCC Pavement Repair.

Cost for drilling holes, furnishing and applying epoxy resin adhesive, furnishing and inserting No. 5 x 24" epoxy coated deformed tie bars into the drilled holes, inserting reinforcing steel bars into the drilled holes, and any incidentals necessary to complete the work will be included in the contract unit price per each for Insert Steel Bar in PCC Pavement.

SAW AND SEAL LONGITUDINAL JOINTS (CRCP)

Longitudinal joints (in line with existing longitudinal joints) at concrete repair areas will be sawed and sealed.

Joint sealing will conform to Section 380.3 P.

Longitudinal joints will be sealed with Low Modulus Silicone Sealant or Hot Poured Elastic Joint Sealer.

Acceptance of the Low Modulus Silicone Sealant and Hot Poured Elastic Joint Sealer will be based on visual inspection by the Engineer.

Cost for sawing and sealing of the longitudinal construction joint will be incidental to the contract unit price per square yard for Continuously Reinforced PCC Pavement Repair.

EDGE DRAINS IN PLACE

Edge drains are in place adjacent to the underlying CRC Pavement at various locations within the following limits:

HWY LANES	SHOULDERS	MRM +DISP	to	MRM +DISP
I29 SB & NB	Median & Outside	85.00 +0.500	to	110.00 +0.200
I90 WB & EB	Median & Outside	401.00 +0.800	to	412.00 +0.400

Edge drains will be retained in place. The Contractor will exercise care in performing pavement repair operations so as not to damage edge drains. Any damage to edge drains incurred as result of the Contractor's operations will be corrected by the Contractor. The Engineer will determine the extent of the damage and specify repair or replacement. Cost for repair or replacement will be entirely at the Contractor's expense.

TIE BAR RETROFIT, STITCHING

Drilling of holes and epoxy resin adhesive will conform to Section 380. Steel bars will conform to Section 1010.

Tie Bar Retrofit, Stitching will be done on longitudinal joints and random cracks as marked out by the Engineer.

The Contractor will insert No. 5 epoxy coated deformed tie bars into drilled holes in the existing concrete pavement. An epoxy resin adhesive must be used to anchor the steel bar in the drilled hole. A rotary drill or other approved drill will be used that will not damage the concrete surface. The diameter of the disturbed surface from drilling will be less than 2 inches. A rigid frame or mechanical device will be required to guide the drill to ensure the proper angle of the steel bars in the drilled holes.

The diameter of the drilled holes in the existing concrete pavement for the steel bars will not be less than 1/8 inch nor more than 3/8 inch greater than the overall diameter of the steel bar. The holes will be drilled at an angle alternating from opposite sides of the joint to produce a cross-stitching pattern.

Fill the drilled holes sufficiently with epoxy prior to the insertion of the tie bar such that the epoxy will be level with the top of the concrete pavement after insertion of the tie bar. Rotate the steel bar during insertion to eliminate voids and ensure complete bonding of the bar. Insertion of the bars by the dipping method will not be allowed. The top of the drilled hole will be filled with epoxy or excess epoxy removed such that the epoxy is level with the existing pavement.

No bars will be inserted within 15" of an existing transverse contraction joint. Any bars not functioning or damaged will be repaired or replaced at the Contractor's expense.

Cost for the epoxy resin adhesive, tie bars, drilling of holes, debris or loose material removal, applying the adhesive, inserting the tie bars into the drilled holes and incidentals necessary for the insertion of the tie bars will be included in the contract unit price per each for Tie Bar Retrofit, Stitching.

REPAIR TYPE A SPALLS

Concrete Patch Material will be Type III conforming to Section 390.2 B.3.

As an alternative, the Contractor may remove concrete by milling, provided it produces results similar to the sawing and chipping process described in the Specifications.

Spalls which are repaired according to plans and specifications and exhibit partial respalling or cracking, will be repaired to the satisfaction of the Engineer at no additional cost to the State.

NOSING MATERIAL FOR CONCRETE REPAIR

1. A quantity of Nosing Material has been set up for use if spalling occurs, an existing crack is too close to the new saw cut, or a crack intersects the new saw cut for the Membrane Sealant Expansion Joint. The following quantity of 8 square feet is included in the Estimate of Quantities. This is based on a width of 26 feet and a length of 0.3 feet at full 11" depth. Actual depth may vary from full 11" depth to 2" partial depth spalls. The Engineer will determine if and where this nosing material is to be used.
2. The nosing material used must be one of types from the approved product list for Nosing Material. The nosing material will be furnished from one source and must be installed in accordance with the manufacturer's recommendations as approved by the Engineer.
3. The nosing material will be measured to the nearest 0.1 square foot. The Engineer will make measurements on the driving surface to the nearest 0.1 foot. Joint nosing material repairs will be paid for at the contract unit price per nearest square foot installed. Cost for material, removal of concrete, cleaning substrate, labor, equipment, tools and any incidentals necessary to prep, furnish and install the nosing material will be incidental to the contract unit price per square foot for Joint Nosing Material.

5" SAW CUT OF CRC AT TERMINAL ANCHOR LOCATIONS

A 5" opening saw cut is required in the CRC at these terminal anchor locations and may require a multi-step process if the existing sealant joint is fully compressed. If the existing joint is fully compressed, the Contractor will be required to cut the joint to a 3" opening across the right lane. As soon as possible and on the same day, the Contractor will be required to adjust traffic control to install a lane closure to provide a 3" opening saw cut across the left lane. Traffic will not be permitted across any expansion joint wider than 3". Installation of the 5" joint membrane will not be permitted for one week.

Upon completion of the 1-week waiting period, the contractor will be required to set up traffic control in the right lane, resaw the joint to the required 5" and install the new 5" membrane joint sealant in the right lane. As soon as possible and on the same day, the Contractor will be required to adjust traffic control to install a lane closure to resaw the joint in the left lane to the required 5" and install the new 5" membrane joint sealant in the left lane.

See the traffic control details in the plans for lane closure details for this work.

SEAL RANDOM CRACKS IN PCC PAVEMENT (NRCP)

Random cracks will be repaired in accordance with the detail for Sealing Random Cracks. Reservoir dimensions may vary slightly from the details, due to the nature of this operation. However, any variance due to Contractor negligence will be repaired at the Contractor's expense.

Only those random cracks in the existing concrete pavement that are open and accept water and incompressible materials as selected by the Engineer will be prepared and sealed with either Low Modulus Silicone Sealant or Hot Poured Elastic Joint Sealer.

Prior to sealing, each random crack will be routed and thoroughly cleaned with compressed air or by other methods satisfactory to the Engineer. Routing will be performed with a saw designed for that purpose.

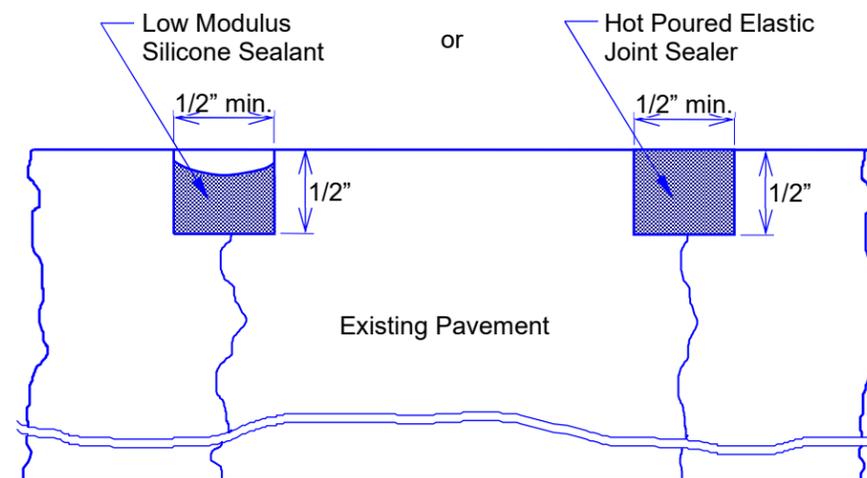
Random cracks narrower than 1/2 inch will be routed and sealed 1/2 inch wide by 1/2 inch deep.

Random cracks wider than 1/2 inch may require the placement of a backer rod prior to sealing. Use of backer rod should be limited to locations where, once placed, the top of the backer rod will be a minimum of 2 1/4 inches below the top surface of the pavement. The hot pour in cracks wider than 1/2" should be placed 2 inch thick with the final surface of the hot pour remaining recessed 1/4 inch below the top surface of the pavement.

Sealant will be placed in the routed reservoir with equipment and by methods that insure complete and uniform filling. Hot Poured Elastic Joint Sealer will be placed level with the driving surface of the concrete for cracks 1/2" or narrower. Low Modulus Silicone Sealant will have a tooled surface with the top middle portion of the sealant recessed. Any excess or overrun of sealant will be removed by the Contractor at no additional cost to the State.

Acceptance of the Low Modulus Silicone Sealant and Hot Poured Elastic Joint Sealer will be based on visual inspection by the Engineer.

Seal Random Cracks in PCC Pavement will be measured by the foot to the nearest 0.1 foot of random cracks sealed and accepted and will be paid for at the contract unit price per foot measured for payment. Payment will be full compensation for labor, equipment, material and incidentals required for crack routing, cleaning, furnishing and installing backer rod when necessary, furnishing and placing sealant and removing routed and foreign material from the roadway.



SEAL RANDOM CRACKS IN PCC PAVEMENT (CRCP)

Random cracks that exhibit minor spalling will be routed, sealed and overbanded in accordance with the detail for Sealing Random Cracks. Reservoir dimensions may vary slightly from the details, due to the nature of this operation. However, any variance due to Contractor negligence will be repaired at the Contractor's expense.

Only those random cracks in the existing concrete pavement that are open and accept water and incompressible materials as selected by the Engineer will be prepared, sealed and overbanded with Hot Poured Elastic Joint Sealer. Typically, patterned cracks associated with the underlying steel reinforcement should not be routed and sealed.

Prior to sealing, each random crack will be routed and thoroughly cleaned with compressed air or by other methods satisfactory to the Engineer. Routing will be performed with a saw designed for that purpose.

Random cracks narrower than 1/2 inch will be routed and sealed 1/2 inch wide by 1/2 inch deep.

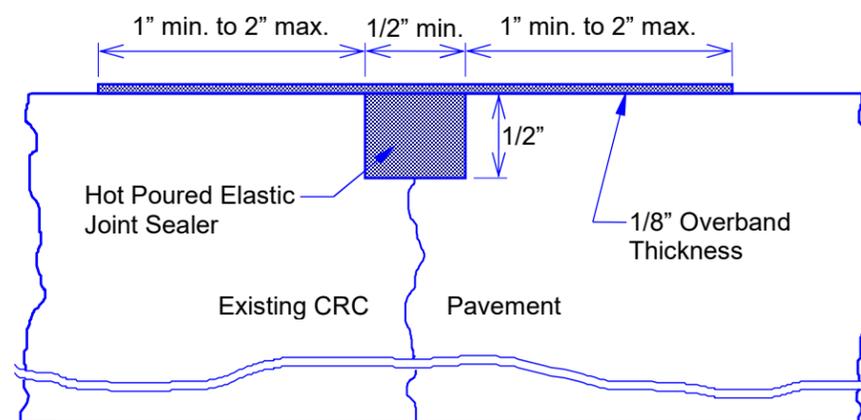
Random cracks wider than 1/2 inch may require the placement of a backer rod prior to sealing. Use of backer rod should be limited to locations where, once placed, the top of the backer rod will be 2 inches below the top surface of the pavement, resulting in a maximum hot pour depth of 2 inches.

Sealer will be placed in the routed reservoir with equipment and by methods that insure complete and uniform filling. Sealer will be overbanded to prohibit further respalling of the joint.

Acceptance of the sealer will be based on visual inspection by the Engineer.

Seal Random Cracks in PCC Pavement will be measured by the foot to the nearest 0.1 foot of random cracks sealed and accepted and will be paid for at the contract unit price per foot measured for payment. Payment will be full compensation for labor, equipment, material and incidentals required for crack routing, cleaning, furnishing and installing backer rod when necessary, furnishing and placing sealant, overbanding and removing routed and foreign material from the roadway.

SEALING RANDOM CRACKS



REPLACING CURB & GUTTER ADJACENT TO DROP INLETS

Damaged concrete curb and gutter around drop inlets will be sawed full depth and removed and replaced with concrete curb and gutter.

Lengths of curb and gutter removal will be as directed by the Engineer.

New concrete curb and gutter will be tied to adjacent PCC Pavement and existing concrete curb and gutter with deformed tie bars and reinforcing steel will be placed as shown on the Layout for Replacing Concrete Curb & Gutter Adjacent to Drop Inlet.

Cost for performing this work will be according to the notes for REPAIR CONCRETE CURB AND/OR GUTTER.

REPAIR CONCRETE CURB AND/OR GUTTER

The existing concrete curb and gutter is variable throughout the Sioux Falls Area. New curb and/or gutter will match in place.

Refer to the repair tables and details for locations of removal and replacement. These locations will be designated by the Engineer on construction.

If the end of any section to be removed does not fall on an existing joint, a sawed joint (3" to 4" deep) must be made to provide a vertical face for the new joint.

Existing foundation material will be shaped and compacted to a firm, uniform bearing surface, conforming to the existing section or established grades as set by the Engineer. Unsuitable foundation material will be removed and replaced as directed.

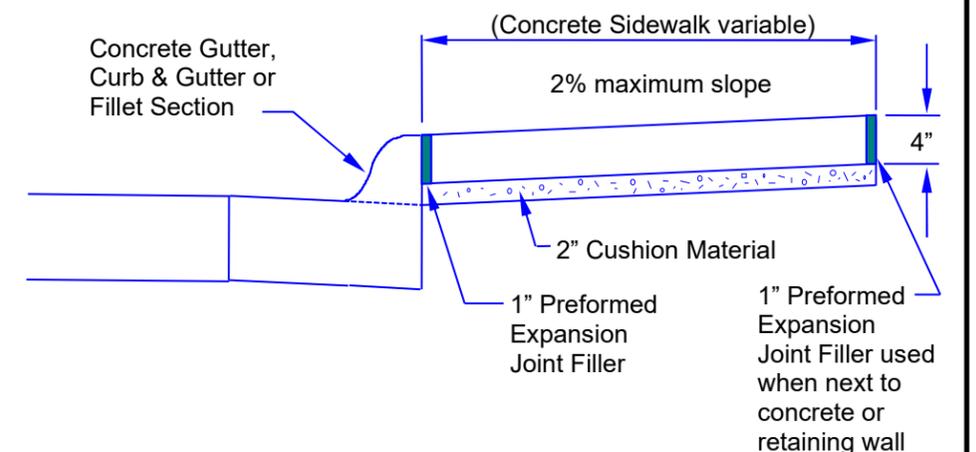
Cost for labor, equipment, material and incidentals required for excavation and providing cushion material will be incidental to the contract unit prices for the various items.

Curb and/or Gutter will be tied to existing PCC pavement with drilled in No. 5 x 24" epoxy coated deformed tie bars spaced 30" center to center or by salvaged in place tie bars. Also, two No. 5 x 24" epoxy coated deformed tie bar will be drilled into the existing curb and/or gutter at each end of the replacement area. Refer to the notes for STEEL BAR INSERTION.

Cost for this work will be included in the contract unit price per each for Insert Steel Bar in PCC Pavement.

The Contractor will satisfactorily restore disturbed areas adjacent to the new concrete placement to the satisfaction of the Engineer. Cost for this restoration work will be incidental to the contract unit prices for the various items.

Standard specifications for sawing, removing and replacing concrete curb and/or gutter, and material composition will apply except that the cost for such will be included in the contract unit price per foot for Repair Concrete Curb and/or Gutter.



TEMPORARY PAVEMENT MARKING

Cost for temporary pavement marking for stop bars and individual lane closure tapers that must remain overnight will be incidental to the contract unit price per site for Traffic Control for Pavement Repair.

Temporary pavement marking on centerline will consist of temporary flexible vertical markers (tabs) and will be used as depicted on Standard Plate 634.25 when the stop condition must remain in place during nighttime hours 9:00PM to 6:00AM.

Temporary pavement marking for stop bars will consist of 4" Temporary Pavement Marking Tape Type I. Placement of each 24" white stop bar may be accomplished by placing six pieces of 4" x 12' tape adjacent to one another. Each workspace requires two stop bars which is an equivalent of approximately 144' of 4" tape.

CONTACTOR FURNISHED PORTABLE CHANGEABLE MESSAGE SIGN

One week prior to starting work affecting the traveling public, portable changeable message signs (PCMS) will be installed at locations detailed in the plans to notify drivers of the upcoming construction. The Contractor will program the portable changeable message signs with the following message:

ROAD WORK
STARTS (Date)

When work begins that will affect traffic patterns, the Contractor will re-program the PCMS with the messages as detailed in the plans.

LANE CLOSURES

Interstate lane closures shorter than 5 miles will be used if 5 miles is greater than the length of work that can be accomplished in one day's production. More than one lane closure may be permitted; however, there will be a minimum of a three-mile section between lane closures, excluding the tapers.

Interstate lane closures will be removed when work will not be occurring for a period of 3 or more calendar days. Activities that do not involve workers being present, such as curing time for concrete, constitute work. Lane closures will not be set up on a Friday if no work will be occurring on Saturday or Sunday. In these cases, the lane closure will be installed on Monday.

MAINTENANCE OF TRAFFIC – PCC PAVEMENT REPAIR

Enough quantity has been included in these plans for 3 work zones for the work on Eastbound I90, and 3 work zones for Westbound I90. The Department will pay for 6 Mobilization, 6 arrow boards, and 6 traffic control set-ups for the work on I90. Any work zones in excess of the 6 included in the plans for the planned work on I90 will be done at the Contractor's expense at no additional cost to the Department.

Additional Type 3 Barricades will be installed facing traffic within the closed lane at a spacing of 1/4 mile. At intersecting roadways, two additional Type 3 Barricades will be used to block the entire closed lane and shoulder.

Each mainline concrete repair location from which the in-place concrete has been removed will be marked with a minimum of two reflectorized drums.

Construction workspaces on undivided roadways will be limited to 300 feet in length. Drivers in two-way traffic workspaces must be able to see approaching traffic through and beyond the work zone. If traffic cannot see approaching vehicles, 24-hour flagging will be required.

Construction workspaces in urban areas will be limited to 3 blocks in length. The minimum distance between workspaces will be 3 blocks.

When work is in progress within an intersection, Flaggers will be required to direct traffic.

Holes adjacent to centerline in the lane open to traffic created during removal and replacement of PCC Pavement Repair areas will be filled with gravel cushion material and cold-mix asphalt concrete prior to opening the lane to traffic. Gravel cushion material and cold-mix asphalt concrete will be furnished by the Contractor.

MAINTENANCE OF TRAFFIC – PCC PAVEMENT REPAIR (CONTINUED)

Holes in the asphalt concrete shoulders created during removal and replacement of PCC Pavement Repair areas will be filled with gravel cushion material and hot-mix asphalt concrete (to match the shoulder surfacing) prior to opening the lane to traffic. Hot-mix asphalt concrete will be furnished by the Contractor at no additional cost to the State.

Cost for furnishing, hauling and placing asphalt concrete will be incidental to the contract unit price per square yard for Nonreinforced PCC Pavement Repair.

Routing traffic onto the mainline shoulders during any phase of the construction will not be allowed.

Damage to the shoulders, median or ditch due to the Contractor's operations will be repaired by the Contractor, to the satisfaction of the Engineer, at no expense to the State. This includes the apparent routing of traffic onto these shoulders around the work zones.

Traffic approaching the project from intersecting roadways, streets and approaches must be adequately accommodated. Major intersections or large commercial entrances may require additional signing, flaggers and other traffic control devices on a temporary basis until work activities pass these areas.

Cost for material (except signs, corresponding supports and hardware), labor, delivery, set up and maintenance of all necessary traffic control devices for each site will be included in the contract unit price per site for Traffic Control for Pavement Repair. Cost for signs, corresponding supports and hardware will be included in the contract unit price per square foot for Traffic Control Signs, per Specification.

ITEMIZED LIST FOR TRAFFIC CONTROL SIGNS

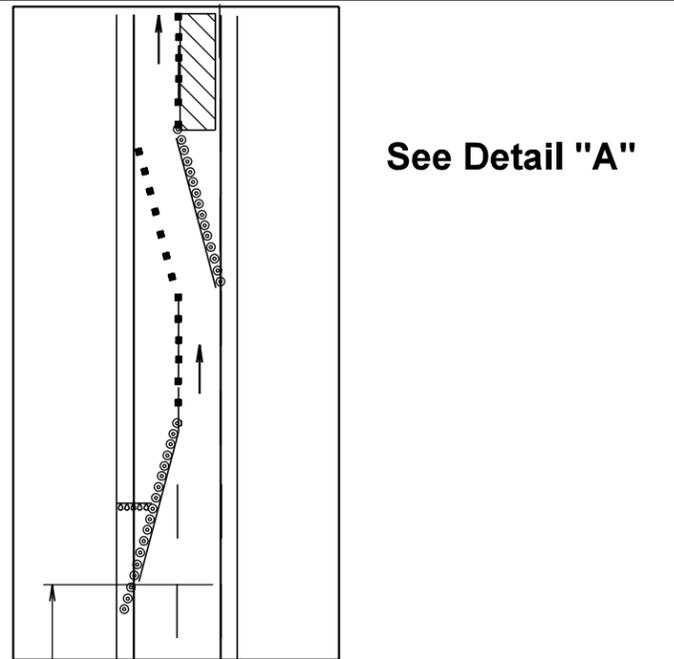
SIGN CODE	SIGN DESCRIPTION	CONVENTIONAL ROAD				EXPRESSWAY / INTERSTATE			
		NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT	NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT
R1-1	STOP	2	30"	5.2	10.4		36"	7.5	
R2-1	SPEED LIMIT 45		24" x 30"	5.0		2	36" x 48"	12.0	24.0
R2-1	SPEED LIMIT 65		24" x 30"	5.0		1	36" x 48"	12.0	12.0
R2-1	SPEED LIMIT 80		24" x 30"	5.0		1	36" x 48"	12.0	12.0
R2-6aP	FINES DOUBLE (plaque)		24" x 18"	3.0		1	36" x 24"	6.0	6.0
W1-3	REVERSE TURN (L or R)	2	48" x 48"	16.0	32.0		48" x 48"	16.0	
W1-4	REVERSE CURVE (L or R)		48" x 48"	16.0		1	48" x 48"	16.0	16.0
W3-1	STOP AHEAD (symbol)	2	48" x 48"	16.0	32.0		48" x 48"	16.0	
W3-5	SPEED REDUCTION AHEAD (45 MPH)		48" x 48"	16.0		1	48" x 48"	16.0	16.0
W3-5	SPEED REDUCTION AHEAD (65 MPH)		48" x 48"	16.0		2	48" x 48"	16.0	32.0
W4-2	LEFT or RIGHT LANE ENDS (symbol)		48" x 48"	16.0		2	48" x 48"	16.0	32.0
W13-1P	ADVISORY SPEED (plaque)	2	30" x 30"	6.3	12.6		30" x 30"	6.3	
W20-1	ROAD WORK AHEAD	2	48" x 48"	16.0	32.0	2	48" x 48"	16.0	32.0
W20-4	ONE LANE ROAD AHEAD	2	48" x 48"	16.0	32.0		48" x 48"	16.0	
W20-5	LEFT or RIGHT LANE CLOSED AHEAD		48" x 48"	16.0		2	48" x 48"	16.0	32.0
W20-7	FLAGGER (symbol)	2	48" x 48"	16.0	32.0	1	48" x 48"	16.0	16.0
G20-2	END ROAD WORK	2	36" x 18"	4.5	9.0	1	48" x 24"	8.0	8.0
		CONVENTIONAL ROAD TRAFFIC CONTROL SIGNS SQFT 192.0				EXPRESSWAY / INTERSTATE TRAFFIC CONTROL SIGNS SQFT 238.0			

LANE SHIFT DETAIL FOR 5" JOINT AT TERMINAL ANCHORS

Plotting Date: 03/29/2022

Posted Speed Prior to Work (M.P.H.)	Spacing of Channelizing Devices (Feet) (G)	Taper Length (Feet) (L)	Spacing of Advanced Warning Signs (Feet) (A) (B) (C)		
0 - 30	25	180	200		
35 - 40	25	320	350		
45 - 50	50 *	600	500		
55	50 *	660	750		
60 - 65	50 *	780	1000		
70 - 80	50 *	960	1000	1500	2640

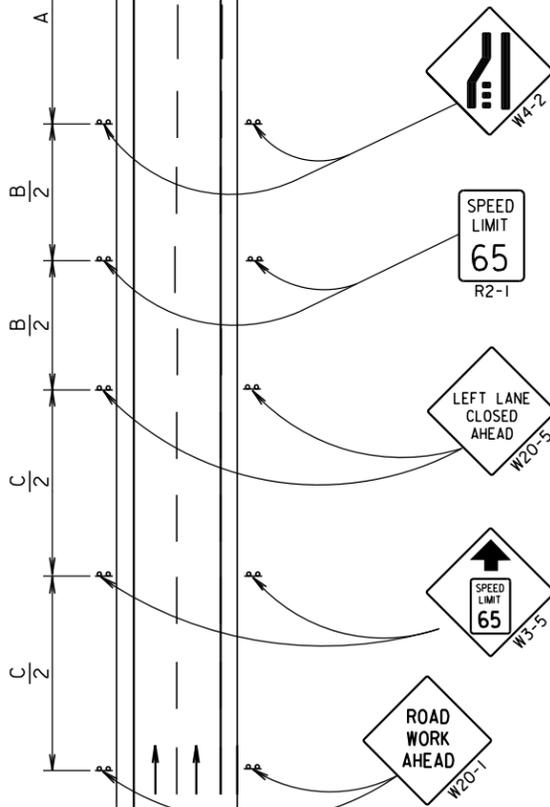
* Spacing to be every 40' for 42" cones.



See Detail "A"

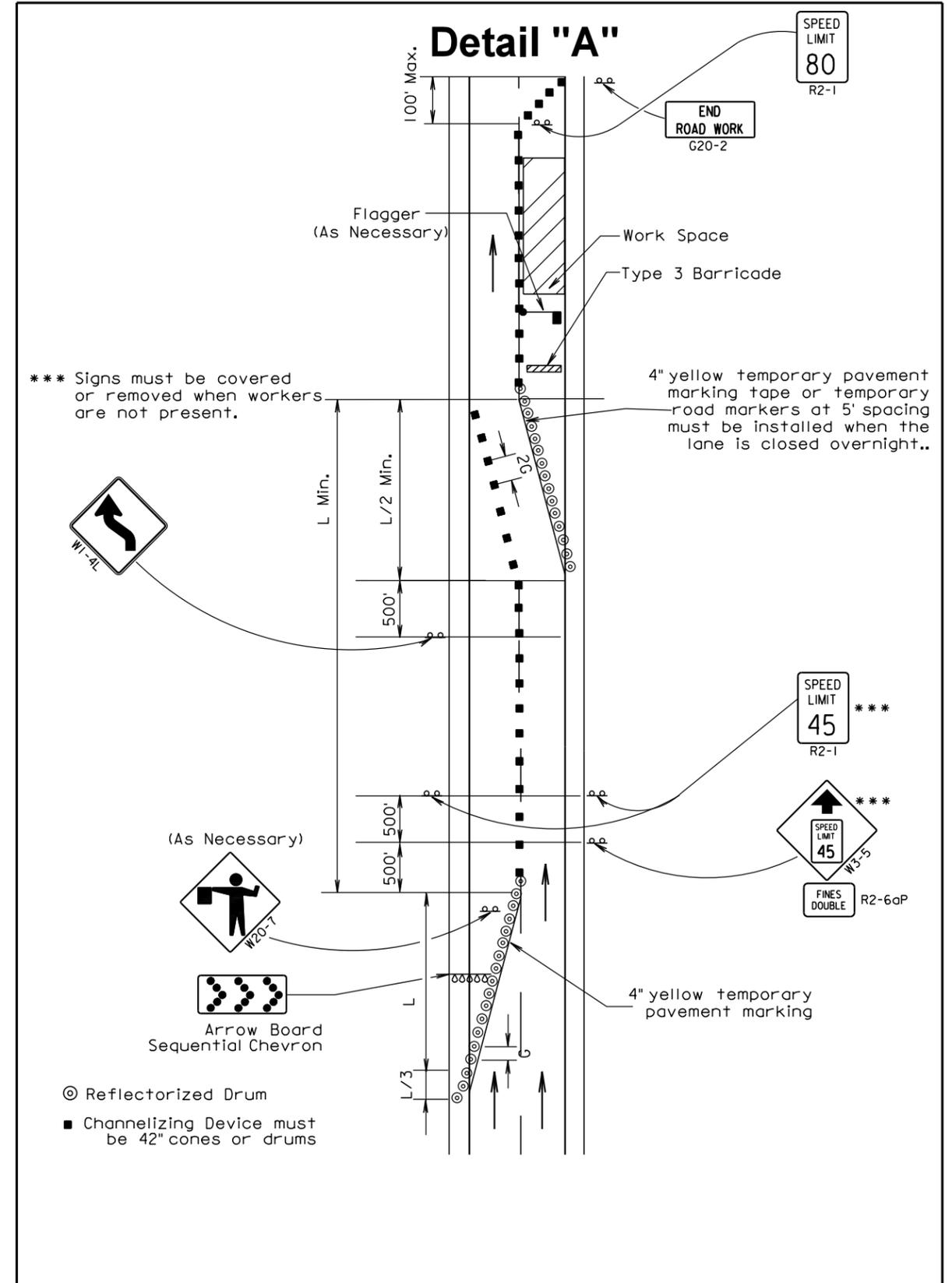
ROAD WORK AHEAD sign is only required in advance of the first lane closure.

The FLAGGER sign must be used whenever there is a Flagger present.



⊙ Reflectorized Drum

■ Channelizing Device must be 42" cones or drums



⊙ Reflectorized Drum

■ Channelizing Device must be 42" cones or drums

TABLE OF REPAIR ON I29 NB & SB

DMI	NB PASSING LANE		NB DRIVING LANE		NRCP REPAIR SqYds	NEW JOINT CON-FIG. (NRCP)	COMMENTS	INSERT STEEL BAR IN PCC PAVEMENT (NRCP)			REPAIR TYPE A SPALL SqFt
	L	W	L	W				No. 9 x 18" DEFORMED TIE BARS	No. 5 x 24" DEFORMED TIE BARS	INSERT STEEL BAR IN NRCP TOTAL	
	Ft	Ft	Ft	Ft				Each	Each	Each	
85.481	4	12	4	14	11.6	T	Replace Expansion Joint	32		32	
101.800							At Expansion Joint				2.00
TOTALS:					11.6			32	-	32	2.0

NRC PAVEMENT REPAIR AREA TYPES
W = Two Working Joints (Use only if repair is full roadway width and uniform length (across all lanes))
T = Two Tied Joints
B = One Working & One Tied Joint
R = Two Tied Joints with Original Joint Restored with Dowel Bar Assembly

TABLE OF REPAIR ON I90 EB

DMI	EB PASSING LANE		EB DRIVING LANE		NRCP REPAIR SqYds	NEW JOINT CON-FIG. (NRCP)	COMMENTS	INSERT STEEL BAR IN PCC PAVEMENT (NRCP)			REPAIR TYPE A SPALL SqFt	
	L	W	L	W				No. 9 x 18" DEFORMED TIE BARS	No. 5 x 24" DEFORMED TIE BARS	INSERT STEEL BAR IN NRCP TOTAL		DOWEL BAR
	Ft	Ft	Ft	Ft				Each	Each	Each		Each
406.007							Begin concrete					
406.011	10	12			13.3	R		16	4	20	12	
406.015							Expansion Joint, Spall @ Anchor					7.00
406.203							Replace Expansion Joint					
411.312							Begin Concrete					
411.320							Replace Expansion Joint					
411.354			10	4	4.4	R		4	8	12	4	
411.384	6	12			8.0	R		16	2	18	12	
411.384	6	12			8.0	R		16	2	18	12	
411.388	6	12			8.0	R		16	2	18	12	
411.392	6	6			4.0	R		8	2	10	6	
411.422	6	12			8.0	R		16	2	18	12	
411.426			4	14	6.2	T		16	2	18		
411.443			4	8	3.6	R		10	4	14	8	
411.444			22	6	14.7	R		8	16	24	6	
411.448			10	4	4.4	T		4	8	12		
411.458			4	4	1.8	R		4	4	8	4	
411.462	20	4			8.9	R		4	8	12	4	
411.473			6	6	4.0	R		8	4	12	6	
411.481			4	4	1.8	R		4	4	8	4	
411.488							Replace Expansion Joint					
411.492							End Concrete					
412.350							Begin Concrete					
412.358							Replace Expansion Joint					
412.361	6	10			6.7	R	14x10 Ramp	12	2	14	10	
412.394			18	4	8.0	T	4x4 Ramp	4	14	18		
412.402	8	4			3.6	R		4	3	7	4	
412.437	6	12			8.0	R		16	2	18	12	
412.441	16	4			7.1	R		4	6	10	4	
412.463			4	2	0.9	R	4x2 Ramp	2	4	6	2	
412.471			4	2	0.9	R	4x2 Ramp	2	4	6	2	
412.482			4	4	1.8	R	Spall	4	4	8	4	
412.520							End SD Pavement					
TOTALS:					136.1			198	111	309	140	7.0
ADDITIONAL QUANTITIES:					30.0			40	20	60	30	-
GRAND TOTALS:					166.1			238	131	369	170	7.0

NRC PAVEMENT REPAIR AREA TYPES

W = Two Working Joints (Use only if repair is full roadway width and uniform length (across all lanes))

T = Two Tied Joints

B = One Working & One Tied Joint

R = Two Tied Joints with Original Joint Restored with Dowel Bar Assembly

TABLE OF REPAIR ON I90 WB

DMI	WB DRIVING LANE		WB PASSING LANE		NRCP REPAIR SqYds	NEW JOINT CON-FIG. (NRCP)	COMMENTS	INSERT STEEL BAR IN PCC PAVEMENT (NRCP)			DOWEL BAR Each	REPAIR TYPE A SPALL SqFt	SEAL RANDOM CRACKS IN PCC PAVEMENT Ft	
	L Ft	W Ft	L Ft	W Ft				1 1/4" x 18" PLAIN ROUND DOWEL BARS Each	No. 9 x 18" DEFORMED TIE BARS Each	No. 5 x 24" DEFORMED TIE BARS Each				INSERT STEEL BAR IN NRCP TOTAL Each
412.515							Begin Concrete (State Line)							
412.488			4	4	1.8	R			4	4	8	4		
412.466			4	4	1.8	T			4	4	8			
412.454	6	14	6	12	17.3	R			32		32	24		
412.443	6	4			2.7	R			4	2	6	4		
412.413			4	4	1.8	T			4	4	8			
412.409	6	14	6	4	12.0			20	20	2	42			
412.386	8	14	8	12	23.1	R	Remove Expansion Joint		32		32	24		
412.384							Seal Random Crack						26	
412.383							Terminal Anchor Spall					4.00		
412.382							Replace Expansion Joint							
412.325							End Concrete							
411.496							Begin Concrete							
411.488							Replace Expansion Joint							
411.445	4	2	4	2	1.8	R	Centerline Repair		4	6	10	4		
411.418							Asphalt Growth Joint							
411.388	6	14			9.3	R			16	2	18	12		
411.328			4	4	1.8	R	Wide Joint		4	4	8	4		
411.326							Seal Randon Crack						26	
411.325							Replace Expansion Joint							
411.317							End Concrete							
406.802							Start Concrete							
406.219							Replace Expansion Joint							
406.038							End Concrete							
406.038							Replace Expansion Joint							
406.029							End Concrete							
TOTALS:					73.4			20	124	28	172	76	4.0	52
ADDITIONAL QUANTITIES:					10.0			-	20	10	30	20	-	10
GRAND TOTALS:					83.4			20	144	38	202	96	4.0	62

NRC PAVEMENT REPAIR AREA TYPES
W = Two Working Joints (Use only if repair is full roadway width and uniform length (across all lanes))
T = Two Tied Joints
B = One Working & One Tied Joint
R = Two Tied Joints with Original Joint Restored with Dowel Bar Assembly

TABLE OF REPAIR ON SD42

DMI	WB DRIVING LANE		NRCP REPAIR SqYds	NEW JOINT CON- FIG. (NRCP)	INSERT STEEL BAR IN PCC PAVEMENT (NRCP)		INSERT STEEL BAR IN NRCP TOTAL Each	DOWEL BAR Each
	L	W			No. 9 x 18" DEFORMED TIE BARS Each	No. 5 x 24" DEFORMED TIE BARS Each		
	Ft	Ft						
358.450	6	12	8.0	R	16	2	18	12
358.454	6	12	8.0	R	16	2	18	12
358.458	6	12	8.0	R	16	2	18	12
359.003	6	12	8.0	R	16	2	18	12
TOTALS:			32.0		64	8	72	48
ADDITIONAL QUANTITIES:			10.0		10	-	10	10
GRAND TOTALS:			42.0		74	8	82	58

NRC PAVEMENT REPAIR AREA TYPES

W = Two Working Joints (Use only if repair is full roadway width and uniform length (across all lanes))

T = Two Tied Joints

B = One Working & One Tied Joint

R = Two Tied Joints with Original Joint Restored with Dowel Bar Assembly

TABLE OF REPAIR ON US81

DMI	SB DRIVING LANE		NB DRIVING LANE		NRCP REPAIR SqYds	NEW JOINT CON-FIG. (NRCP)	INSERT STEEL BAR IN PCC PAVEMENT (NRCP)			DOWEL BAR Each		
	L Ft	W Ft	L Ft	W Ft			1" x 18" PLAIN ROUND DOWEL BARS Each	No. 8 x 18" DEFORMED TIE BARS Each	No. 5 x 24" DEFORMED TIE BARS Each		INSERT STEEL BAR IN NRCP TOTAL Each	
108.560			6	14	9.3	R		16	2	18	12	
110.070			6	14	9.3	R		16	2	18	12	
110.089			8	14	12.4	R		16	3	19	12	
110.100			6	14	9.3	R		16	2	18	12	
110.199			20	8	17.8	R		10	16	26	8	
110.301	6	14			9.3	R		16	2	18	12	
110.339			22	14	34.2	R		16	8	24	12	
110.350			30	6	20.0	R		8	24	32	6	
TOTALS:					121.6			-	114	59	173	86
ADDITIONAL QUANTITIES:					20.0			-	20	10	30	20
GRAND TOTALS:					141.6			-	134	69	203	106

NRC PAVEMENT REPAIR AREA TYPES

W = Two Working Joints (Use only if repair is full roadway width and uniform length (across all lanes))

T = Two Tied Joints

B = One Working & One Tied Joint

R = Two Tied Joints with Original Joint Restored with Dowel Bar Assembly

TABLE OF REPAIR ON VETERANS PARKWAY

STA.	SB DRIVING LANE		SB PASSING LANE		NB PASSING LANE		NB DRIVING LANE		NRCP REPAIR SqYds	NEW JOINT CON-FIG. (NRCP)	COMMENTS	* REMOVE CONCRETE CURB &/OR GUTTER Ft	* TYPE CONCRETE C&G BY SB OUTSIDE SHOULDER Ft	* TYPE CONCRETE C&G BY NB OUTSIDE SHOULDER Ft	INSERT STEEL BAR IN PCC PAVEMENT (NRCP)		INSERT STEEL BAR IN NRCP TOTAL Each	DOWEL BAR Each
	L Ft	W Ft							No. 9 x 18" DEFORMED TIE BARS Each	No. 5 x 24" DEFORMED TIE BARS Each								
0+00										W	North Signal Pole @ Madison St.							
4+45	10	14					8	14	28.0	R	SB Turn Lane	24	12	12	32	7	39	24
6+67												8	8					
12+73	8	24	8	24					42.7	R		16	16		32	9	41	24
37+50											PL Curb And Gutter	20		20				
39+60					7	24	7	14	29.6	R		20		20	32	4	36	24
43+80					6	24	40	4	33.8	R					20	34	54	20
44+00					6	12			8.0	R					16	2	18	12
44+26											Maple Street							
54+30					6	6	20	6	17.3	R					16	18	34	12
54+50					20	6	20	6	26.7	R		6		6	16	24	40	12
TOTALS:									186.1			94	36	58	164	98	262	128
ADDITIONAL QUANTITIES:									40.0			20	10	10	30	20	50	30
GRAND TOTALS									226.1			114	46	68	194	118	312	158

NRC PAVEMENT REPAIR AREA TYPES

W = Two Working Joints (Use only if repair is full roadway width and uniform length (across all lanes))
T = Two Tied Joints
B = One Working & One Tied Joint
R = Two Tied Joints with Original Joint Restored with Dowel Bar Assembly

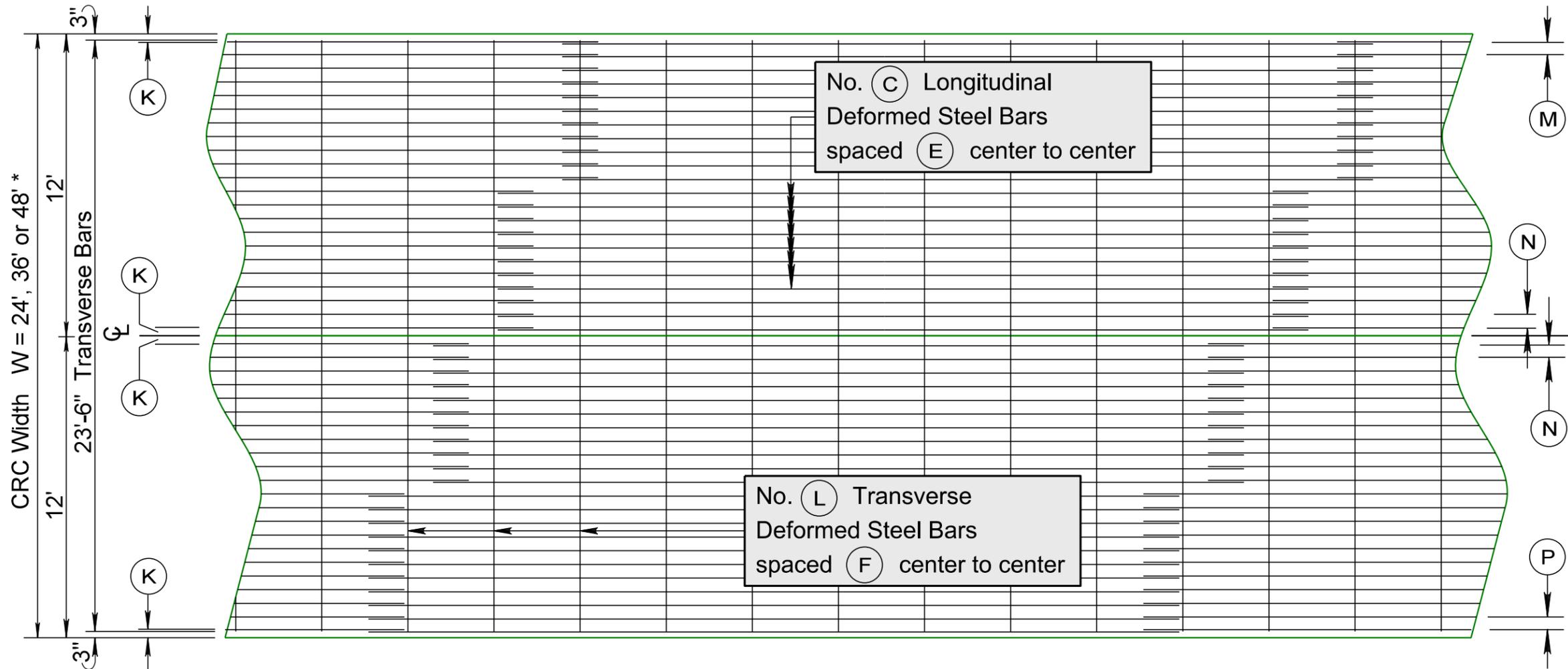
* Cost for this work will be included in the contract unit price per foot for Repair Curb and/or Gutter

24', 36' & 48' * CRC PAVEMENT - IN PLACE

* And other miscellaneous widths (may include CRC shoulders)

STATE OF SOUTH DAKOTA	PROJECT 0009-271	SHEET 15	TOTAL SHEETS 47
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Plotting Date: 03/30/2022



PLOT SCALE - 1:500

PLOT NAME - 2

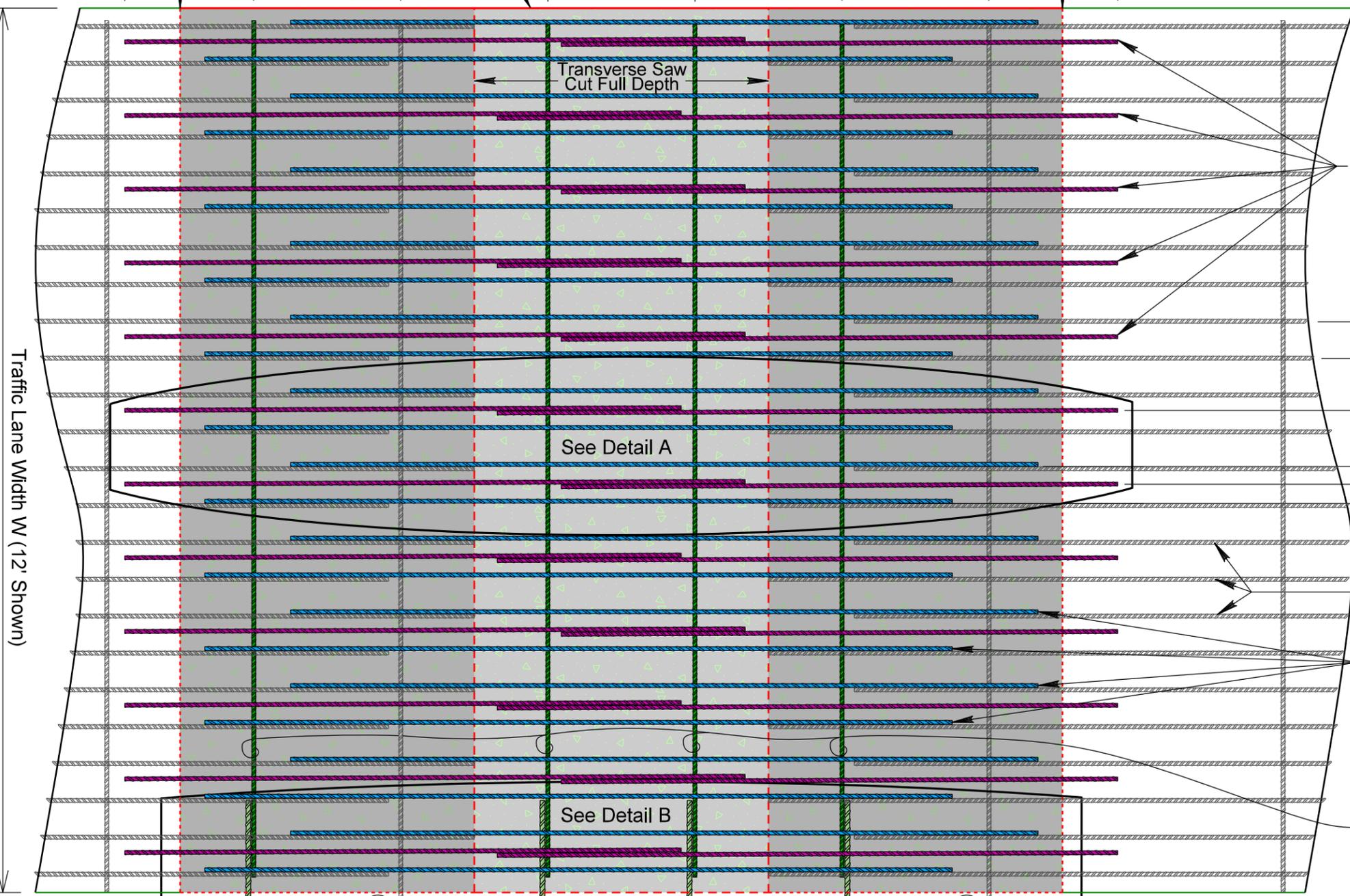
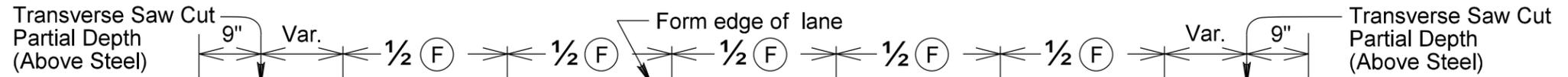
FILE - ... \CRC EXISTING.DGN

PLOTTED FROM - TRMLINT15

MITCHELL REGION INTERSTATE CRC PAVEMENT KEY & DIMENSIONS	Underlying Plans	CRC Depth	CRC Width	Longitudinal Steel		Transverse Steel		Perimeter Bar Spacing			
				Size	Spacing	Size	Spacing	(K)	(M)	(N)	(P)
Location	PCN	T	W	(C)	(E)	(L)	(F)	(K)	(M)	(N)	(P)
I229N/S Approach Slabs for 57th St Tunnel (Double Matte Steel)	0549	10"	52'	4&8	18"&6"	4&6	18"&12"	3"	6"	6"	6"
I229N/S Approach Pavement and Pavement over 57th St Tunnel	0549	10"	52'	7	6"	4	16"	3"	6"	6"	6"
I229N/S MRM 2.08 to 5.32 +0.067 & MRM 5.68 +0.090 to 8.28 +0.687	1231	10.5"	24'/36'	6	6"	4	48"	4"	5"	5"	5"
I29S MRM 83.00 +0.790 to 84.39	3785	10.5"	40'/42'	6	6"	4	48"	4"	5"	5"	5"
I29N/S MRM 73.38 to MRM 73.38 +0.634	1948	11"	34'/36'	7	7"	4	36"	6"	6"	7"	6"
I29N MRM 79.26 +0.246 to 80.29 +0.246 & I29S MRM 79.26 +0.246 to 80.29 +0.251	A443 & 02P3	12"	36'/48'	7	6½"	4	36"	4"	6"	6½"	6"
I29N MRM 80.29 +0.246 to 83.00 +0.790 & I29S MRM 80.29 +0.251 to 83.00 +0.790	1177 & 02P3	12"	36'/48'	7	6½"	4	36"	4"	6"	6½"	6"

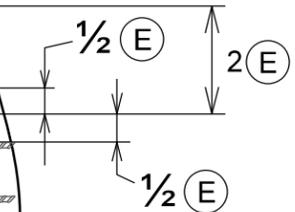
CRC PAVEMENT REPAIR (FULL LANE WIDTH) - TYPICAL

Plotting Date: 03/30/2022



Place No. (C) Longitudinal Deformed Tie Bar (Place bars into drilled holes in existing concrete on both sides of the repair area and tie the bars to each other and to in place No. (L) Transverse Bars)

(E)

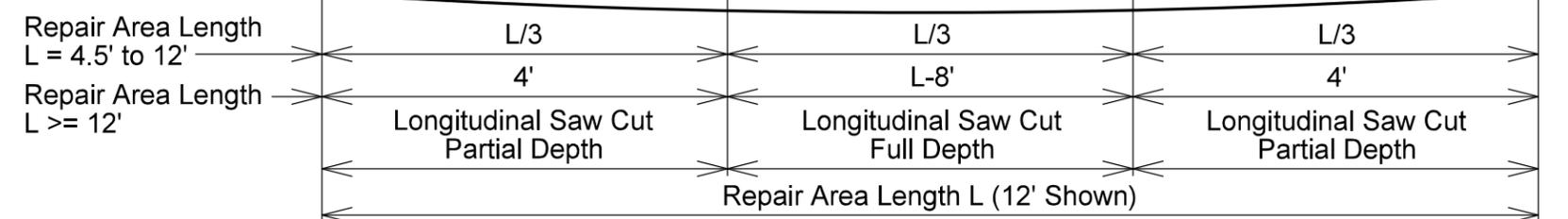


No. (C) Longitudinal Deformed Tie Bars In Place

Place No. (C) Longitudinal Deformed Tie Bars (Lap splice to In Place No. (C) Longitudinal Bars).

For Repair Area Length L = 8' or more - every other in place No. (C) Longitudinal Deformed Tie Bar will be cut off and lap splices will be staggered.

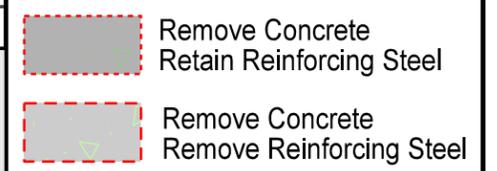
Place No. (L) Transverse Deformed Tie Bars



DEFORMED TIE BAR DIMENSIONS KEY

Underlying Plans	CRC Depth	Longitudinal Steel		Transverse Steel	
		Size	Spacing	Size	Spacing
PCN	T	(C)	(E)	(L)	(F)

CRC REPAIR AREA KEY



Refer to Table for:
CRC PAVEMENT IN PLACE & CRC PAVEMENT REPAIR.

PLOT SCALE - 1:1.7

PLOTTED FROM - TRMLINT15

PLOT NAME - 4

FILE - ... \CRC FULL WIDTH REPAIR.DGN

CRC PAVEMENT REPAIR (FULL LANE WIDTH)

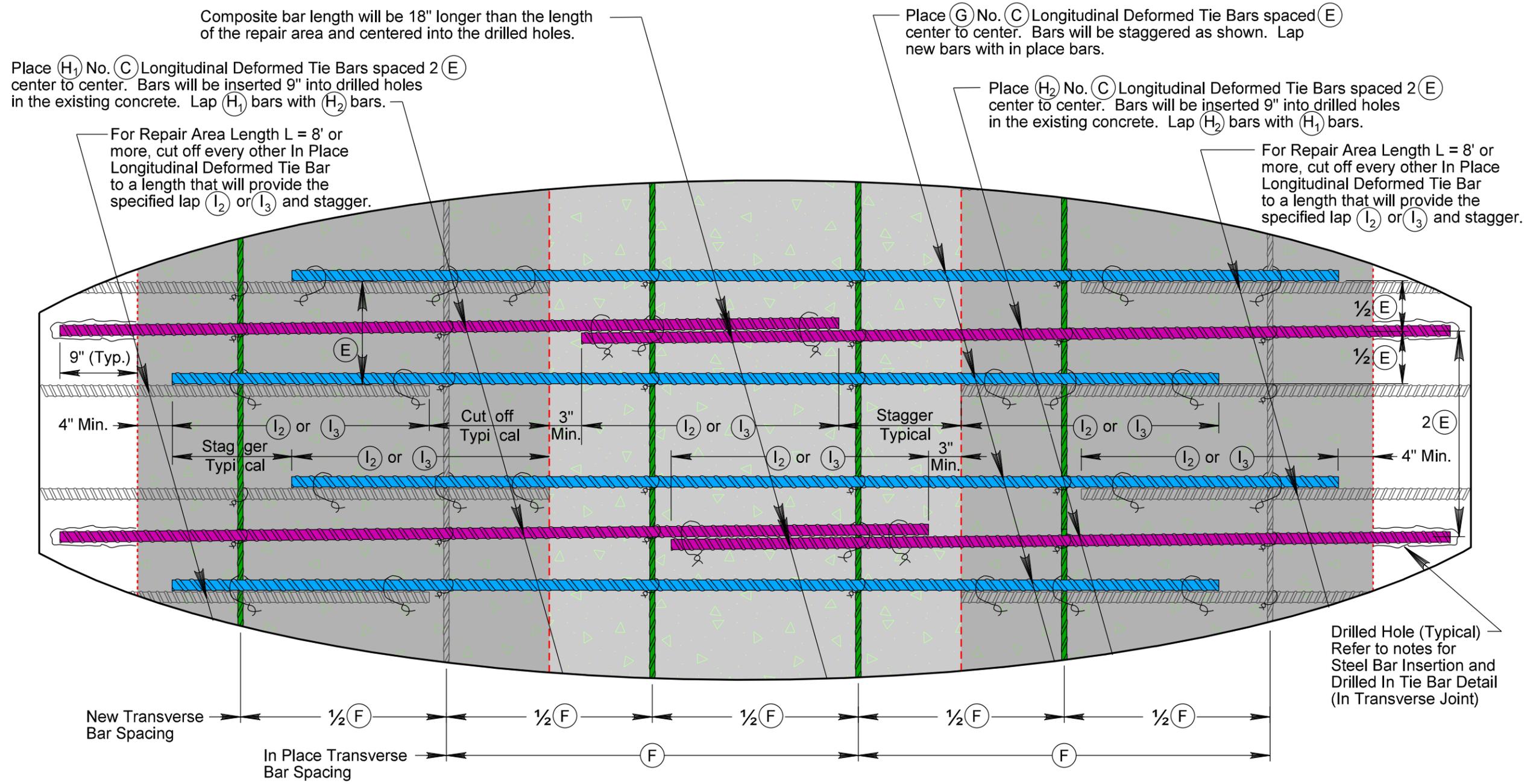
Detail A

Plotting Date: 03/30/2022

PLOT SCALE - 1:1.07

PLOT NAME - 5

FILE - ... \CRC FULL WIDTH REPAIR.DGN



DEFORMED TIE BAR KEY

	No. (C) Longitudinal Deformed Tie Bar In Place (Retain)		No. (L) Transverse Deformed Tie Bar In Place (Retain)
	Place No. (C) Longitudinal Deformed Tie Bar (Tie to In Place No. (C) Longitudinal Bars)		Place No. (L) Transverse Deformed Tie Bar (Tie to No. (C) Longitudinal Bars)
	Place No. (C) Longitudinal Deformed Tie Bar (Place bars into drilled holes in existing concrete on both sides of the repair area and tie the bars to each other and to No. (L) Transverse Bars)		

DEFORMED TIE BAR DIMENSIONS KEY

Underlying Plans	CRC Depth	Longitudinal Steel		Transverse Steel	
		Size	Spacing	Size	Spacing
PCN	T	(C)	(E)	(L)	(F)

Refer to Table for:
CRC PAVEMENT IN PLACE & CRC PAVEMENT REPAIR.

Note: All lapped bars will have a minimum of two ties per lap.

LAP SPLICE LENGTH KEY

(I_1)	Lap Splice length for Repair Area Length $L < 4.5'$ (Not Available).
(I_2)	Lap Splice length for Repair Area Length $L = 4.5'$ to $8'$.
(I_3)	Lap Splice length for Repair Area Length $L > 8'$.

See CRC Pavement Repair - Reinforcing Steel Details for Longitudinal Bar Counts:
 (G) , (H_1) & (H_2)

CRC REPAIR AREA KEY

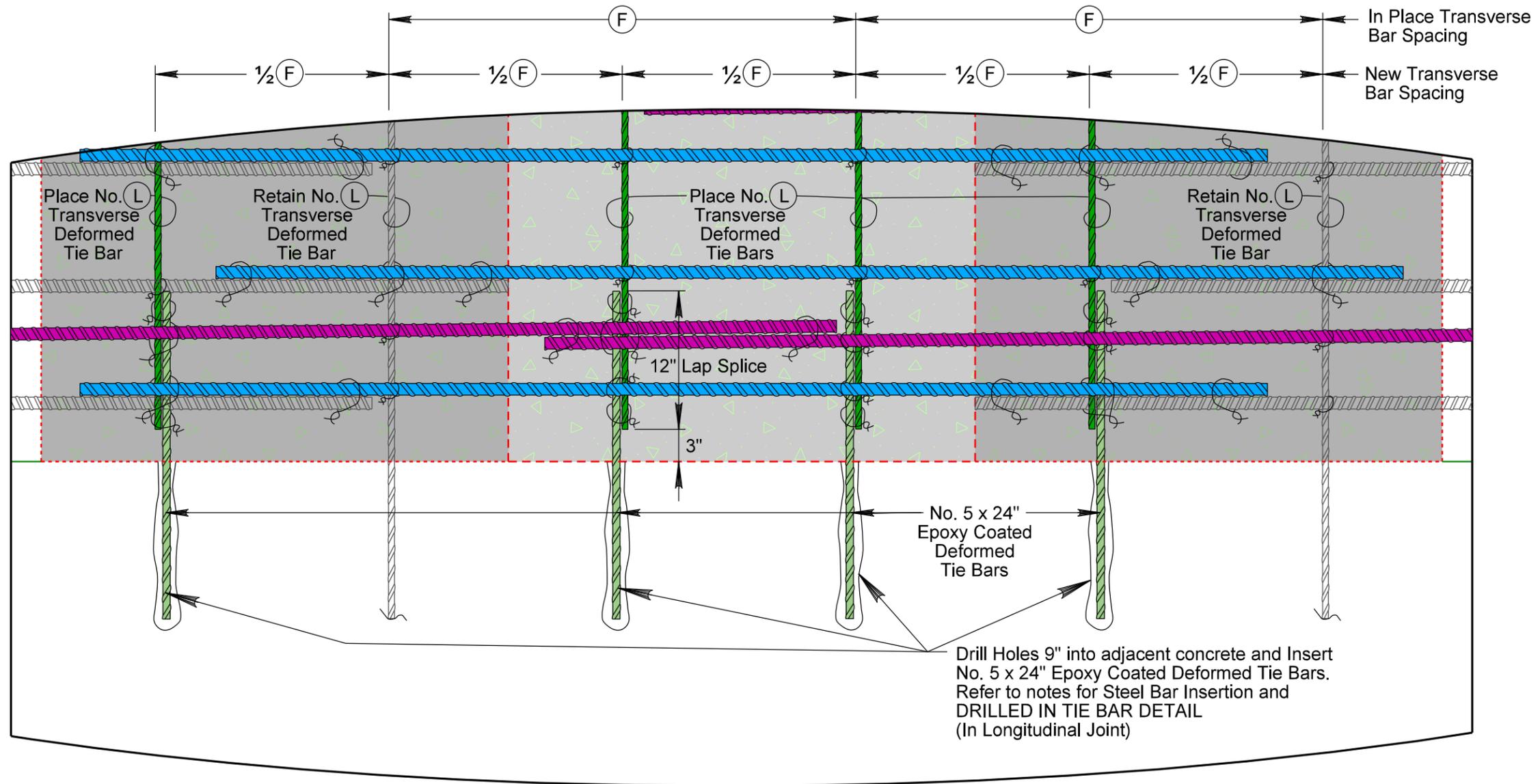
	Remove Concrete Retain Reinforcing Steel
	Remove Concrete Remove Reinforcing Steel

PLOTTED FROM - TRMLINT15

CRC PAVEMENT REPAIR (FULL LANE WIDTH)

Detail B

Plotting Date: 03/30/2022



DEFORMED TIE BAR KEY

<p> No. (C) Longitudinal Deformed Tie Bar In Place (Retain)</p> <p> Place No. (C) Longitudinal Deformed Tie Bar (Tie to In Place No. (C) Longitudinal Bars)</p> <p> Place No. (C) Longitudinal Deformed Tie Bar (Place bars into drilled holes in existing concrete on both sides of the repair area and tie the bars to each other and to No. (L) Transverse Bars)</p>	<p> No. (L) Transverse Deformed Tie Bar In Place (Retain)</p> <p> Place No. (L) Transverse Deformed Tie Bar (Tie to No. (C) Longitudinal Bars)</p>
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DEFORMED TIE BAR DIMENSIONS KEY

Underlying Plans	CRC Depth	Longitudinal Steel		Transverse Steel	
		Size	Spacing	Size	Spacing
PCN	T	(C)	(E)	(L)	(F)

**Refer to Table for:
CRC PAVEMENT IN PLACE &
CRC PAVEMENT REPAIR.**

CRC REPAIR AREA KEY

	Remove Concrete Retain Reinforcing Steel
	Remove Concrete Remove Reinforcing Steel

Note: All lapped bars will have a minimum of two ties per lap.

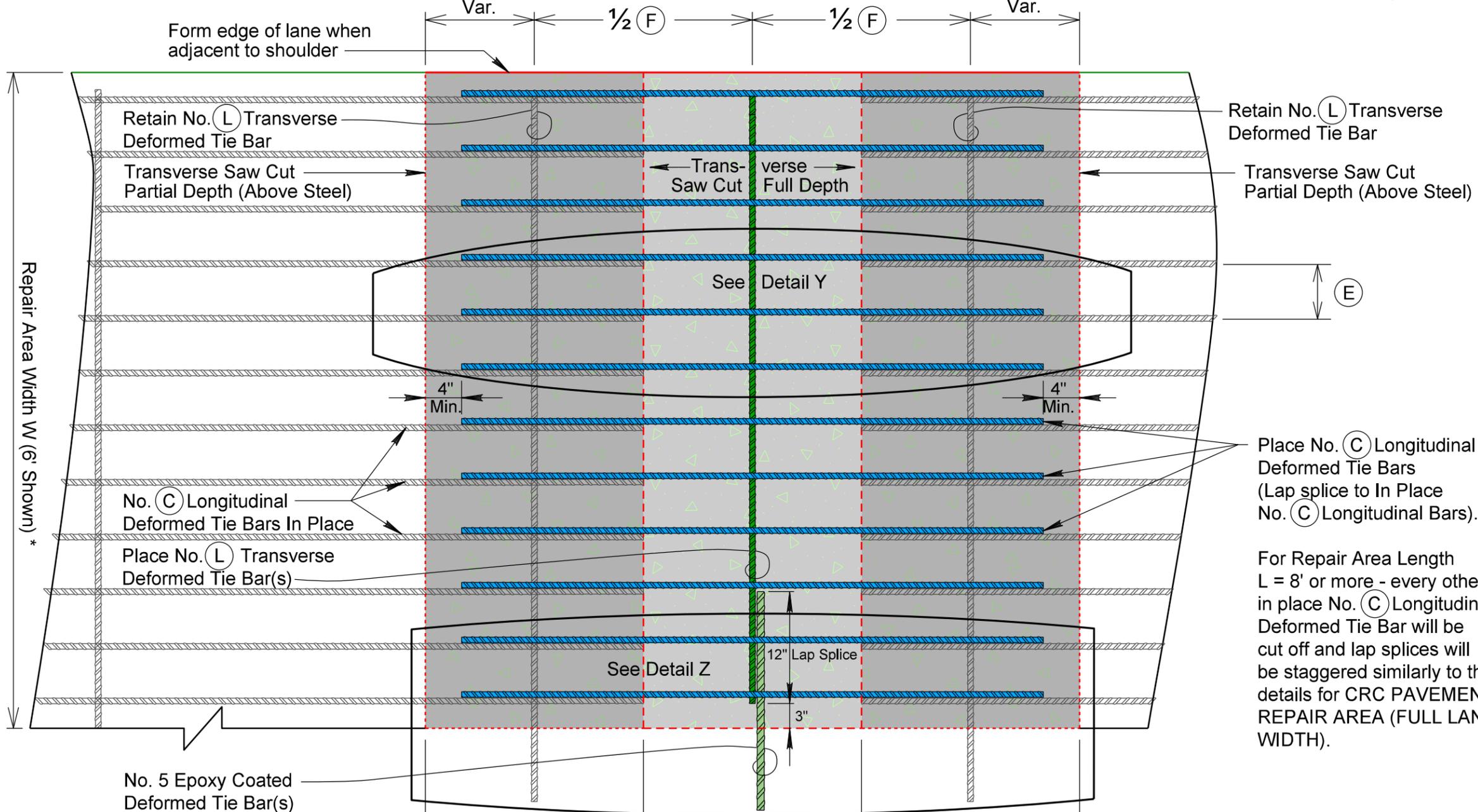
PLOT SCALE - 1:1.07

PLOTTED FROM - TRMLINT15

PLOT NAME - 6

FILE - ... \CRC FULL WIDTH REPAIR.DGN

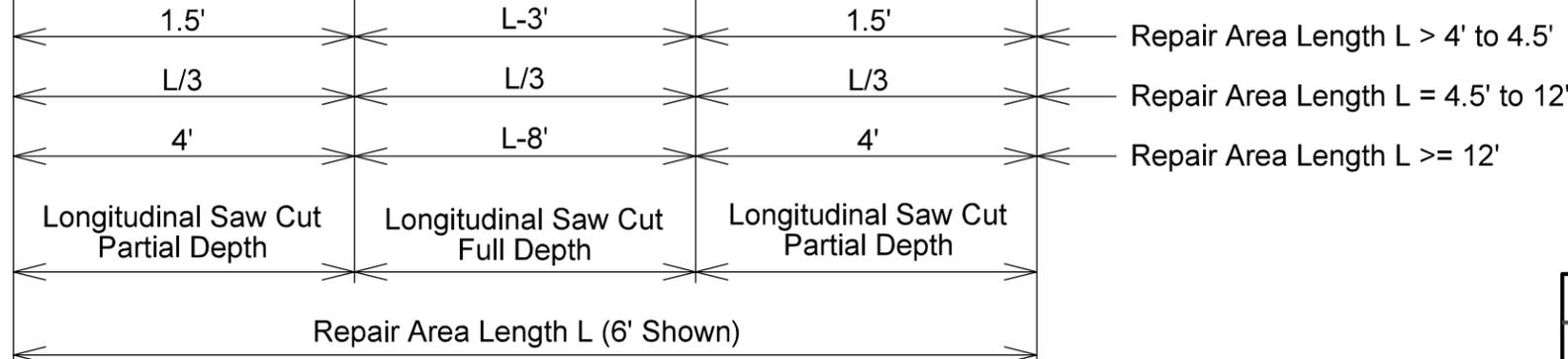
CRC PAVEMENT REPAIR (PARTIAL LANE WIDTH) - TYPICAL



Place No. (C) Longitudinal Deformed Tie Bars (Lap splice to In Place No. (C) Longitudinal Bars).

For Repair Area Length L = 8' or more - every other in place No. (C) Longitudinal Deformed Tie Bar will be cut off and lap splices will be staggered similarly to the details for CRC PAVEMENT REPAIR AREA (FULL LANE WIDTH).

* When the Repair Area Width W exceeds half the lane width, use full lane width repair.



Underlying Plans	CRC Depth	Longitudinal Steel		Transverse Steel	
		Size	Spacing	Size	Spacing
PCN	T	(C)	(E)	(L)	(F)

Refer to Table for:
CRC PAVEMENT IN PLACE &
CRC PAVEMENT REPAIR.

	Remove Concrete Retain Reinforcing Steel
	Remove Concrete Remove Reinforcing Steel

PLOT SCALE - 1:1.06

PLOTTED FROM - TRMLINT15

PLOT NAME - 7

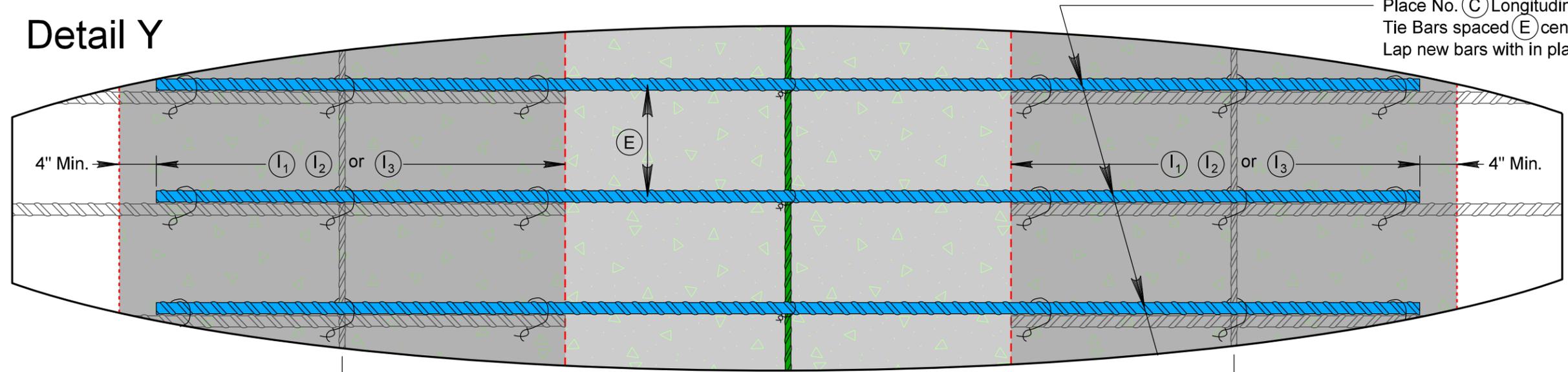
FILE - ... \CRC PARTIAL WIDTH REPAIR.DGN

CRC PAVEMENT REPAIR (PARTIAL LANE WIDTH)

STATE OF SOUTH DAKOTA	PROJECT 0009-271	SHEET 21	TOTAL SHEETS 47
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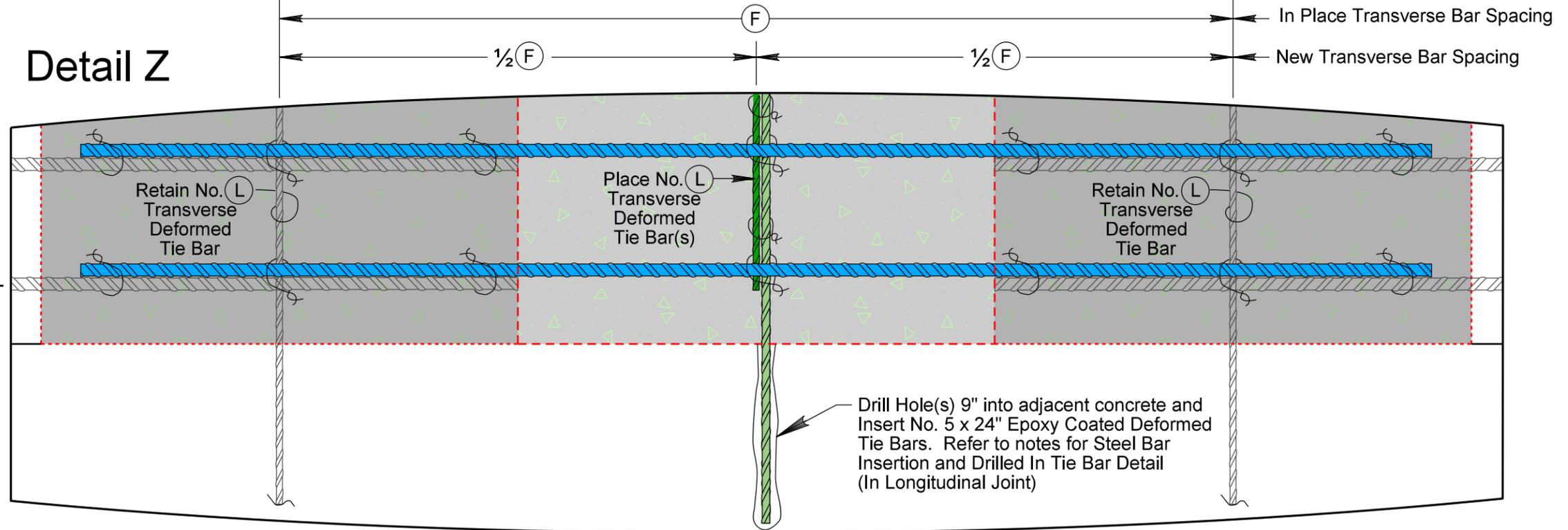
Plotting Date: 03/30/2022

Detail Y



Place No. (C) Longitudinal Deformed Tie Bars spaced (E) center to center. Lap new bars with in place bars.

Detail Z



For Repair Area Length L = 8' or more every other in place No. (C) Longitudinal Deformed Tie Bar will be cut off and lap splices will be staggered similarly to the details for CRC PAVEMENT REPAIR AREA (FULL LANE WIDTH).

Drill Hole(s) 9" into adjacent concrete and Insert No. 5 x 24" Epoxy Coated Deformed Tie Bars. Refer to notes for Steel Bar Insertion and Drilled In Tie Bar Detail (In Longitudinal Joint)

DEFORMED TIE BAR DIMENSIONS KEY

No. (L) Transverse Deformed Tie Bar In Place (Retain)	Place No. (C) Longitudinal Deformed Tie Bar In Place (Retain)
Place No. (L) Transverse Deformed Tie Bar (Tie to No. (C) Longitudinal Bars)	Place No. (C) Longitudinal Deformed Tie Bar (Tie to In Place No. (C) Longitudinal Bars)

Underlying Plans	CRC Depth	Longitudinal Steel		Transverse Steel	
		Size	Spacing	Size	Spacing
PCN	T	(C)	(E)	(L)	(F)
Refer to Table for: CRC PAVEMENT IN PLACE & CRC PAVEMENT REPAIR.					

LAP SPLICE LENGTH KEY

- (I₁) Lap Splice length for Repair Area Length L = 4' to 4.5'.
- (I₂) Lap Splice length for Repair Area Length L = 4.5' to 8'.
- (I₃) Lap Splice length for Repair Area Length L > 8'.

Note: All lapped bars will have a minimum of two ties per lap.

CRC REPAIR AREA KEY

	Remove Concrete Retain Reinforcing Steel
	Remove Concrete Remove Reinforcing Steel

PLOT SCALE - 1:1.06

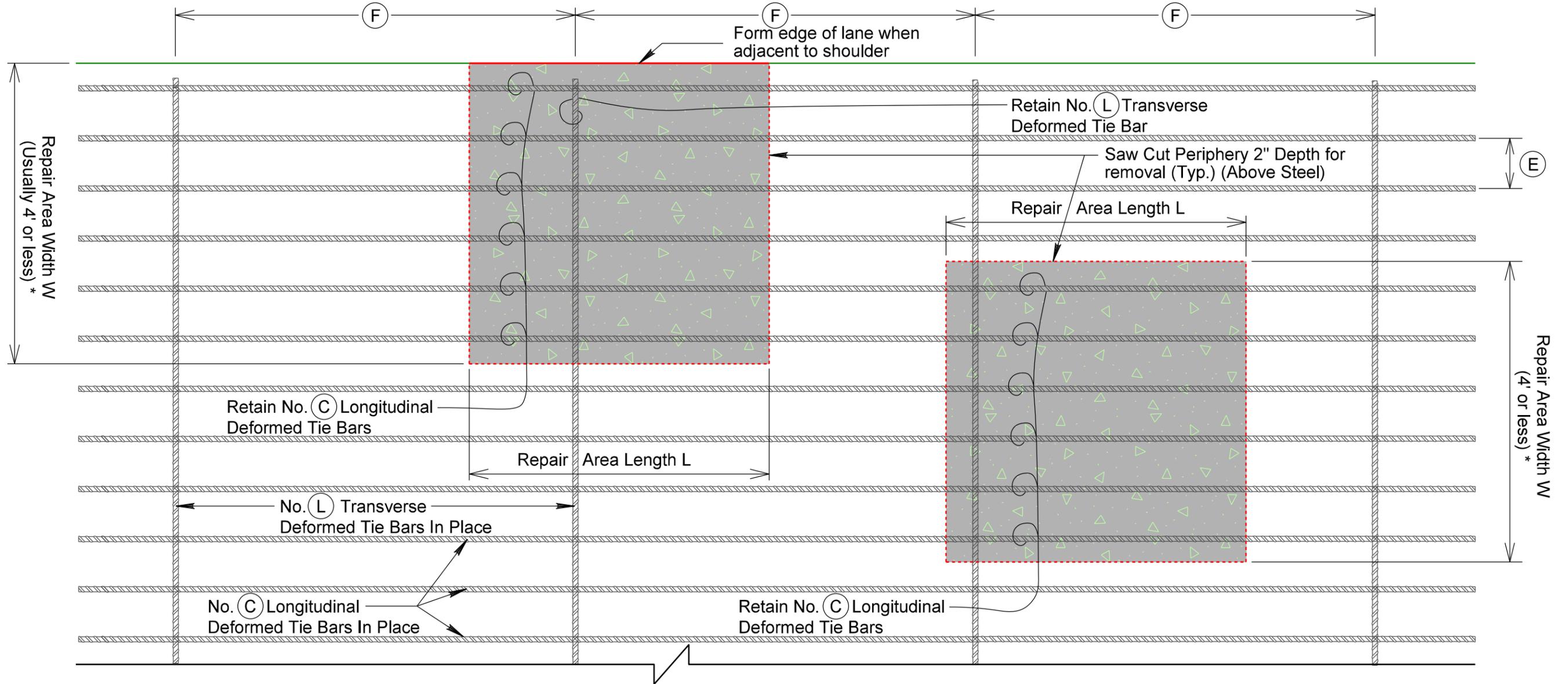
PLOT NAME - 8

FILE - ... \CRC PARTIAL WIDTH REPAIR.DGN

CRC PAVEMENT REPAIR - EXISTING STEEL RETAINED (TYPICAL)

Plotting Date: 03/30/2022

PLAN VIEW



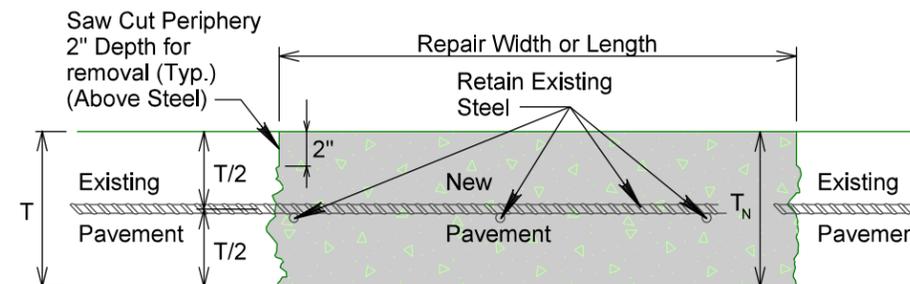
* When Repair Width W exceeds 4', usually use partial lane width repair.
When Repair Width W exceeds half the lane width, usually use full lane width repair.

However, a Repair Width W exceeding 4' might be used when doing a small repair adjacent to an existing repair, in order to match the width of the existing repair.

DEFORMED TIE BAR DIMENSIONS KEY

 No. (L) Transverse Deformed Tie Bar In Place (Retain)	Underlying Plans	CRC Depth	Longitudinal Steel		Transverse Steel	
	PCN	T	Size (C)	Spacing (E)	Size (L)	Spacing (F)
 No. (C) Longitudinal Deformed Tie Bar In Place (Retain)	Refer to Table for: CRC PAVEMENT IN PLACE & CRC PAVEMENT REPAIR.					

PROFILE VIEW



T = Existing pavement thickness.
T_N = New pavement thickness.

CRC REPAIR AREA KEY



PLOT SCALE - 1=1.06

PLOTTED FROM - TRMLINT15

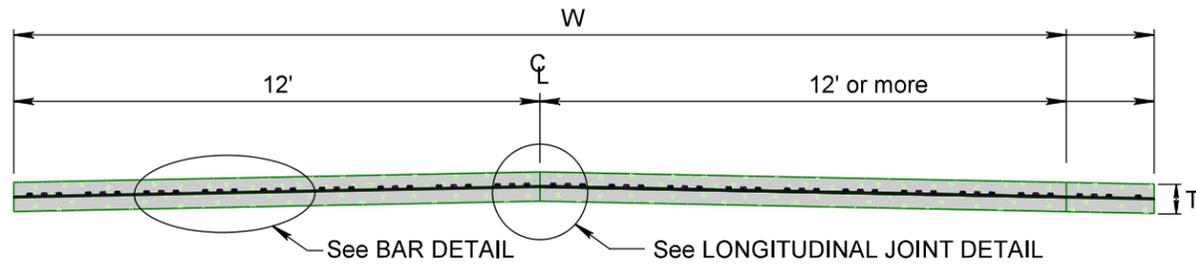
PLOT NAME - 9

FILE - ... \CRC SMALL REPAIR.DGN

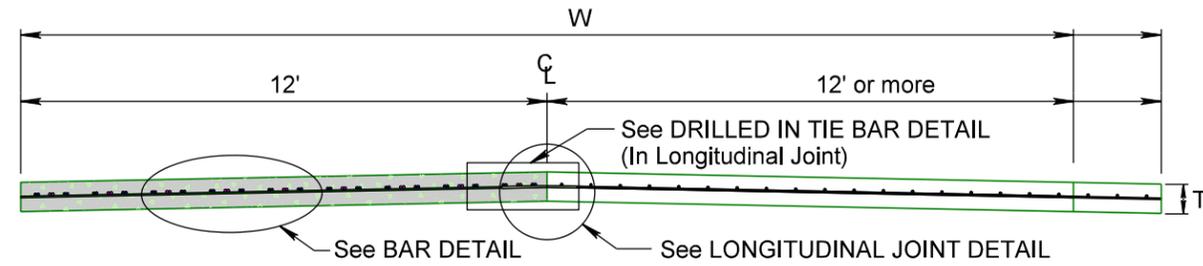
CRC PAVEMENT REPAIR - REINFORCING STEEL DETAILS

Plotting Date: 03/30/2022

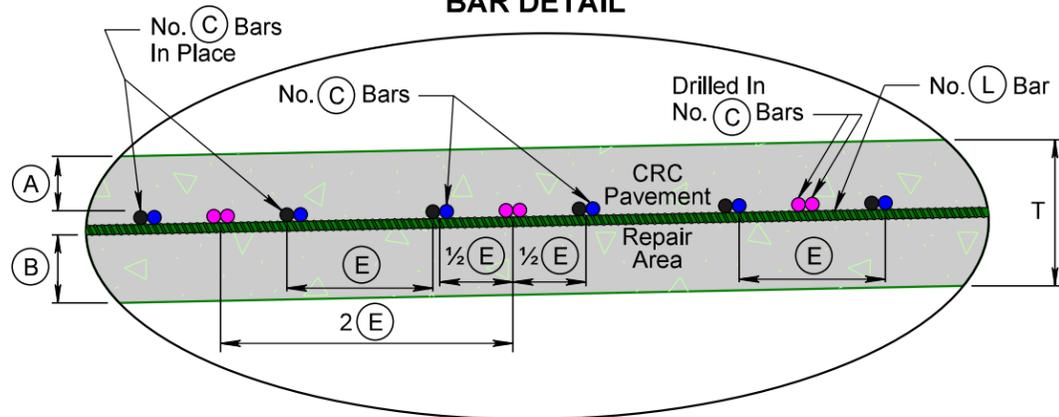
TRANSVERSE SECTION SHOWING STEEL PLACEMENT



TRANSVERSE SECTION SHOWING STEEL PLACEMENT



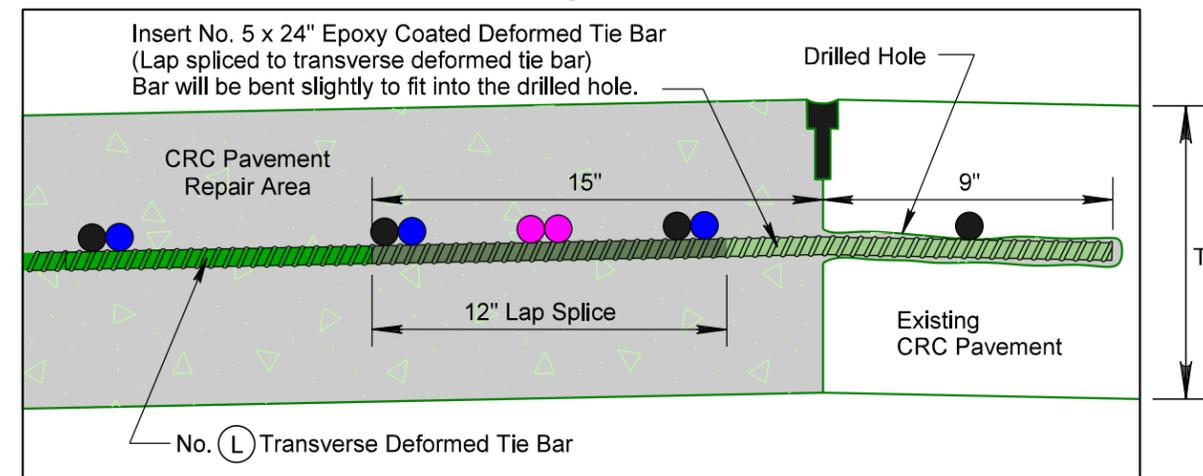
BAR DETAIL



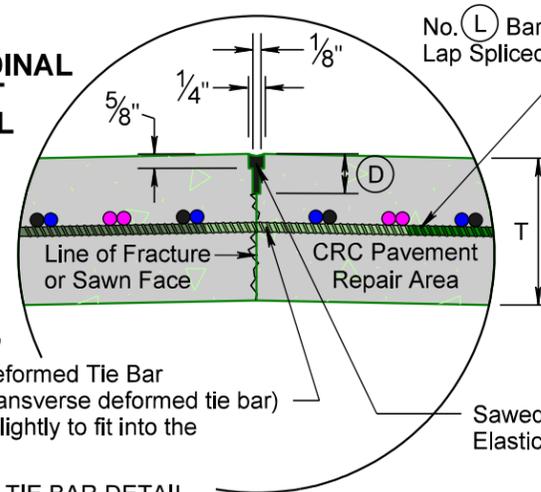
Placement of longitudinal steel bars may vary from +1/2" to -1/2" vertically and 3/4" horizontally. Placement of transverse steel bars may vary from +1/2" to -1/2" vertically and 2" horizontally.

The transverse deformed steel bars will be positioned on acceptable chairs.

DRILLED IN TIE BAR DETAIL (In Longitudinal Joint)



LONGITUDINAL JOINT DETAIL



No. L Bar Lap Spliced
No. L Transverse Deformed Tie Bar

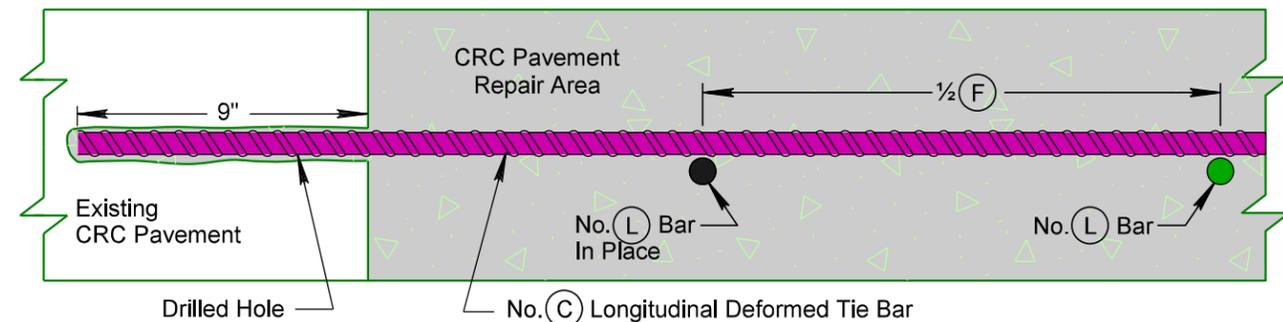
NOTE:

Steel bars for concrete reinforcement will conform to the requirements of Specification M31 (Grade 60) of the AASHTO Standard Specifications for Deformed Billet Steel Bars for Concrete Reinforcement.

Insert No. 5 x 24" Epoxy Coated Deformed Tie Bar (Lap spliced to transverse deformed tie bar) Bar will be bent slightly to fit into the drilled hole.

See DRILLED IN TIE BAR DETAIL (In Longitudinal Joint)

LONGITUDINAL SECTION SHOWING STEEL PLACEMENT DRILLED IN TIE BAR DETAIL (In Transverse Joint)



CRC PAVEMENT IN PLACE & CRC PAVEMENT REPAIR KEY & DIMENSIONS

Location	Underlying Plans PCN	CRC Depth T	CRC Width W	Clearance		Longitudinal Steel		Saw Cut Depth D	Transverse Steel		Longitudinal Bar Count (full lane width repair)						Lap Splice Length (for Repair Length L)			Not Assigned -	Perimeter Bar Spacing				Chair Width R
				Top A	Bottom B	Size C	Spacing E		Size L	Spacing F	12' Wide Slab		14' Wide Slab		L<4.5' l1	L=4.5' to 8'9" l2	L>=8'9" l3	K	M		N	P			
											G	H1	H2	G									H1	H2	
Refer to Table for: CRC PAVEMENT IN PLACE & CRC PAVEMENT REPAIR.																									

PLOT SCALE - 1/8"=33.3333

PLOTTED FROM - TRMLINT15

PLOT NAME - 10

FILE - ... \CRC BARS.DGN

CRC PAVEMENT IN PLACE & CRC PAVEMENT REPAIR

MITCHELL REGION INTERSTATE CRC PAVEMENT KEY & DIMENSIONS

PLOT SCALE - 1"=8'.33333

PLOT NAME - 11

Location	Under lying Plans	CRC Depth	CRC Width	Clearance		Longitudinal Steel		Saw Cut Depth	Transverse Steel		Longitudinal Bar Count (full lane width repair)						Lap Splice Length (for Repair Length L)			Not Assigned	Perimeter Bar Spacing				Chair Width
				Top	Bottom	Size	Spacing		Size	Spacing	12' Wide Slab			14' Wide Slab			L<4.5'	L= 4.5' to 8'9"	L>=8'9"		(K)	(M)	(N)	(P)	
				(A)	(B)	(C)	(E)		(D)	(L)	(F)	(G)	(H ₁)	(H ₂)	(G)	(H ₁)	(H ₂)	(I ₁)	(I ₂)		(I ₃)	(R)			
I29N MRM 85.00 +0.405 to MRM 97.00 +0.766	3784	8"	26'	3"	3 3/4"	6	8"	2"	4	36"	18	9	9	21	10	10	14"	14" to 25"	25"	-	4"	8"	8"	8"	5"
I29S MRM 85.00 +0.435 to MRM 97.00 +0.766	3785	8"	26'	3 1/4"	3 1/2"	6	8"	2"	4	36"	18	9	9	21	10	10	14"	14" to 25"	25"	-	4"	8"	8"	8"	5"
I29N MRM 97.00 +0.766 to MRM 110.10 +0.123	203P	8"	26'	3"	3 3/4"	6	8"	2"	4	36"	18	9	9	21	10	10	14"	14" to 25"	25"	-	4"	8"	8"	8"	5"
I29S MRM 97.00 +0.766 to MRM 110.11 +0.093	4428	8"	26'	3"	3 3/4"	6	8"	2"	4	36"	18	9	9	21	10	10	14"	14" to 25"	25"	-	4"	8"	8"	8"	5"
I90E MRM 401.61 +0.124 to MRM 412.52	3945	8"	26'	3"	3 3/4"	6	8"	2"	4	36"	18	9	9	21	10	10	14"	14" to 25"	25"	-	4"	8"	8"	8"	5"
I90W MRM 401.61 +0.123 to MRM 412.52	3467	8"	26'	3"	3 3/4"	6	8"	2"	4	36"	18	9	9	21	10	10	14"	14" to 25"	25"	-	4"	8"	8"	8"	5"
I229N/S Appr Slabs - 57th St Tunnel (Dbl Matte Steel)	0549	10"	52'	2 1/2"	2"	4&8	18"&6"	2 1/2"	4&6	18"&12"	8&24	4&12	4&12	-	-	-	14"	14" to 25"	25"	-	3"	6"	6"	6"	5"
I229N/S Appr PCCP & PCCP over 57th St Tunnel	0549	10"	52'	4 1/2"	4 1/2"	7	6"	2 1/2"	4	16"	24	12	12	-	-	-	14"	14" to 25"	25"	-	3"	6"	6"	6"	5"
I229N/S MRM 2.08 to MRM 5.32 +0.067	1231	10.5"	24'/36'	3 3/4"	5 1/2"	6	6"	2 5/8"	4	48"	24	12	12	-	-	-	14"	14" to 25"	25"	-	4"	5"	5"	5"	5"
I229N/S MRM 5.68 +0.090 to MRM 8.28 +0.687	1231	10.5"	24'/36'	3 3/4"	5 1/2"	6	6"	2 5/8"	4	48"	24	12	12	-	-	-	14"	14" to 25"	25"	-	4"	5"	5"	5"	5"
I29S MRM 83.00 +0.790 to MRM 84.39	3785	10.5"	40'/42'	3 3/4"	5 1/2"	6	6"	2 3/4"	4	48"	24	12	12	-	-	-	14"	14" to 25"	25"	-	4"	5"	5"	5"	5"
I29S MRM 84.39 to MRM 84.00 +0.910	3785	10.5"	26'	3 3/4"	5 1/2"	6	6"	2 3/4"	4	48"	24	12	12	28	14	14	14"	14" to 25"	25"	-	4"	5"	5"	5"	5"
I29N MRM 61.00 +0.888 to MRM 72.00 +0.866	5360	11"	26'	4"	5 3/4"	6	6"	2 3/4"	4	48"	24	12	12	28	14	14	L<4.5'	L= 4.5' to 9'	L>=9'	-	4"	5"	5"	5"	5"
I29S MRM 61.00 +0.888 to MRM 62.00 +0.443	5360	11"	26'	4"	5 3/4"	6	6"	2 3/4"	4	48"	24	12	12	28	14	14	14"	14" to 30"	30"	-	4"	5"	5"	5"	5"
I29S MRM 62.00 +0.443 to MRM 72.00 +0.875	5367	11"	26'	4"	5 3/4"	6	6 1/2"	2 3/4"	4	48"	22	11	11	26	13	13	14"	14" to 30"	30"	-	3 3/4"	6 1/2"	6 1/2"	4 1/2"	5"
I29N MRM 72.00 +0.866 to MRM 73.38	1948	11"	26'	4"	5 3/8"	7	7"	2 3/4"	4	36"	20	10	10	23	11	11	14"	14" to 30"	30"	-	6"	6"	7"	9"	5"
I29S MRM 72.00 +0.875 to MRM 73.38	1948	11"	26'	4"	5 3/8"	7	7"	2 3/4"	4	36"	20	10	10	23	11	11	14"	14" to 30"	30"	-	6"	6"	7"	9"	5"
I29S MRM 73.38 to MRM 73.38 +0.634	1948	11"	34'/36'	4"	5 3/8"	7	7"	2 3/4"	4	36"	20	10	10	-	-	-	14"	14" to 30"	30"	-	6"	6"	7"	6"	5"
I29N MRM 73.38 to MRM 73.38 +0.634	1948	11"	34'/36'	4"	5 3/8"	7	7"	2 3/4"	4	36"	20	10	10	-	-	-	14"	14" to 30"	30"	-	6"	6"	7"	6"	5"
I29N MRM 79.26 +0.246 to MRM 80.29 +0.246	A443*	12"	36'/48'	4"	6 3/8"	7	6 1/2"	3"	4	36"	22	11	11	-	-	-	14"	14" to 30"	30"	-	4"	6"	6 1/2"	6"	6"
I29S MRM 79.26 +0.246 to MRM 80.29 +0.251	A443*	12"	36'/48'	4"	6 3/8"	7	6 1/2"	3"	4	36"	22	11	11	-	-	-	14"	14" to 30"	30"	-	4"	6"	6 1/2"	6"	6"
I29N MRM 80.29 +0.246 to MRM 83.00 +0.790	1177*	12"	36'/48'	4"	6 3/8"	7	6 1/2"	3"	4	36"	22	11	11	-	-	-	14"	14" to 30"	30"	-	4"	6"	6 1/2"	6"	6"
I29S MRM 80.29 +0.251 to MRM 83.00 +0.790	1177*	12"	36'/48'	4"	6 3/8"	7	6 1/2"	3"	4	36"	22	11	11	-	-	-	14"	14" to 30"	30"	-	4"	6"	6 1/2"	6"	6"

* Also Refer to PCN 02P3 for Approaches to Structures at Madison Street & Benson Road

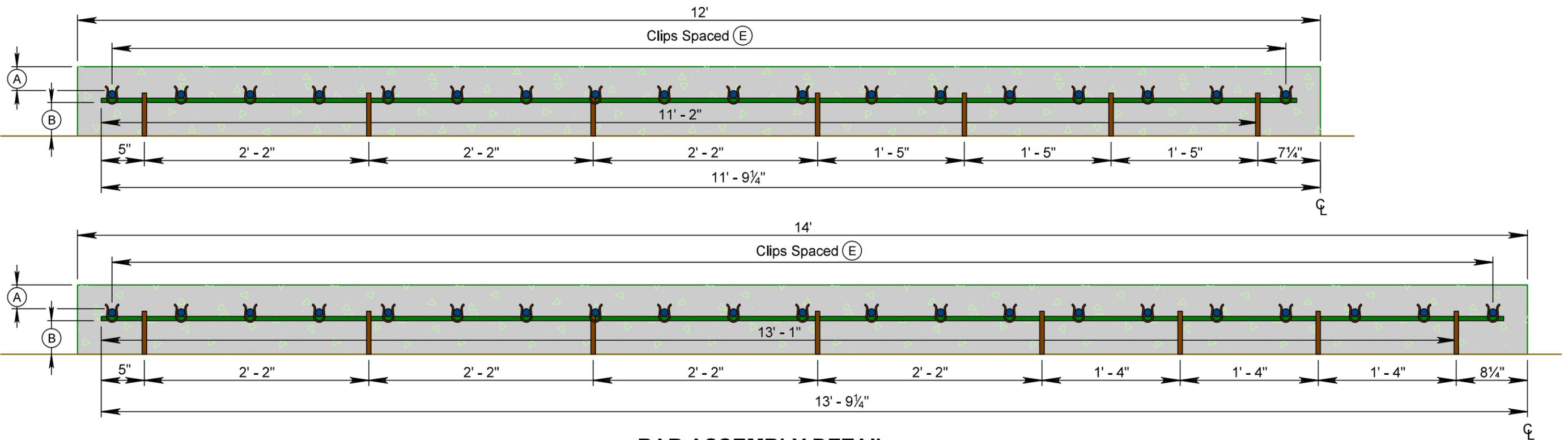
PLOTTED FROM - TRMLINT15

FILE - ... \CRC BARS.DGN

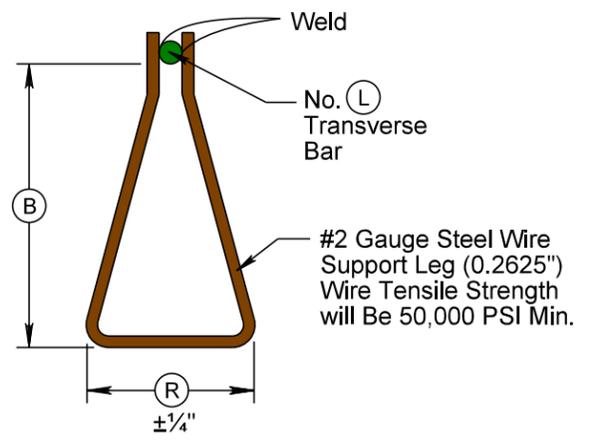
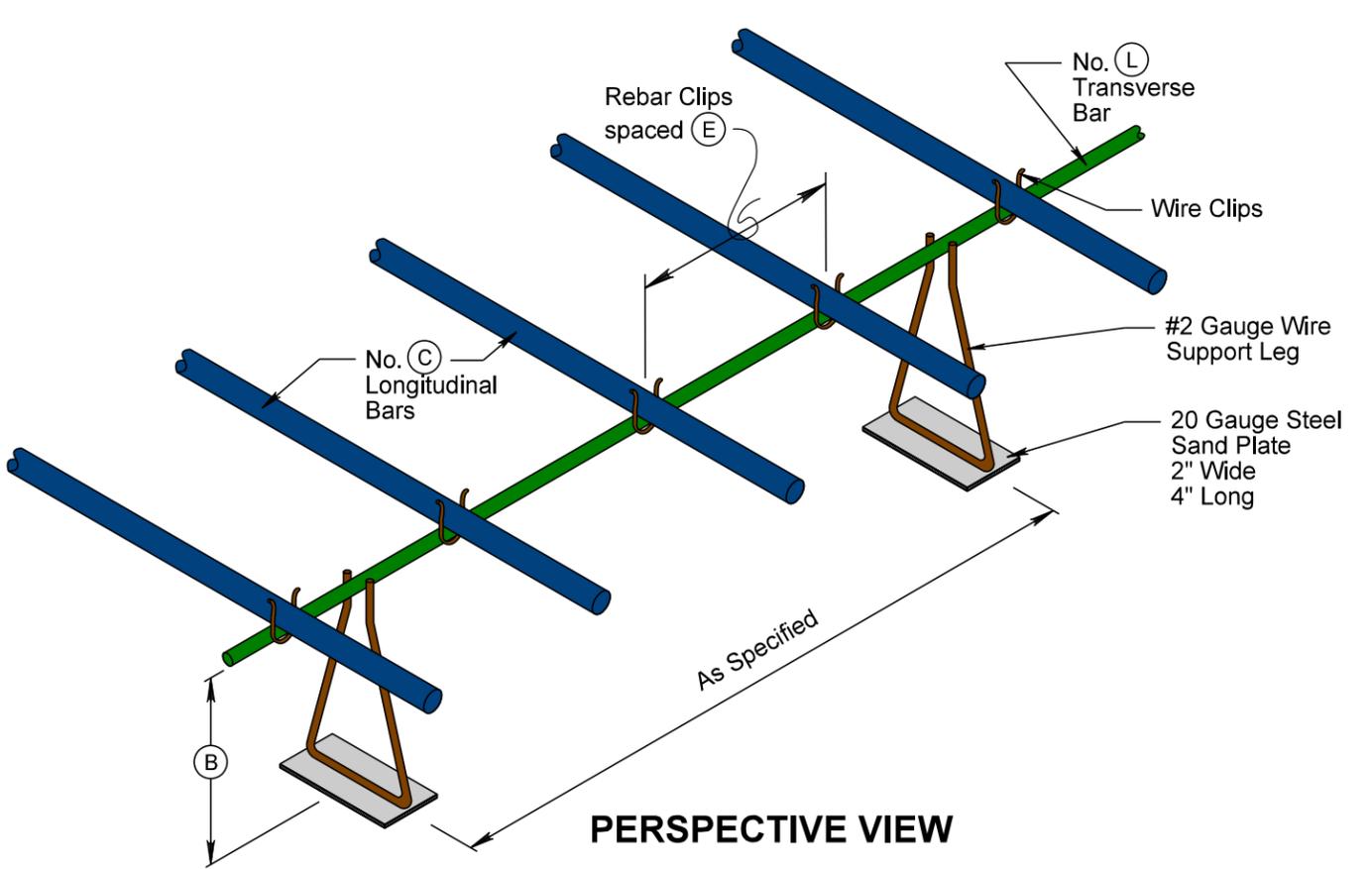
CRC PAVEMENT CHAIR DETAILS

STATE OF SOUTH DAKOTA	PROJECT 0009-271	SHEET 25	TOTAL SHEETS 47
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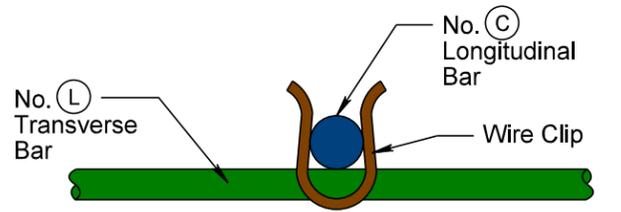
Plotting Date: 03/30/2022



BAR ASSEMBLY DETAIL



CHAIR DETAIL



CLIP DETAIL

DEFORMED TIE BAR DIMENSIONS KEY										
Underlying Plans	CRC Depth	CRC Width	Clearance		Longitudinal Steel		Saw Cut Depth	Transverse Steel		Chair Width
			Top	Bottom	Size	Spacing		Size	Spacing	
PCN	T	W	(A)	(B)	(C)	(E)	(D)	(L)	(F)	(R)
Refer to Table for: CRC PAVEMENT IN PLACE & CRC PAVEMENT REPAIR.										

PLOT SCALE - 1:1

PLOT NAME - 12

FILE - ... \CRC CHAIR DETAILS.DGN

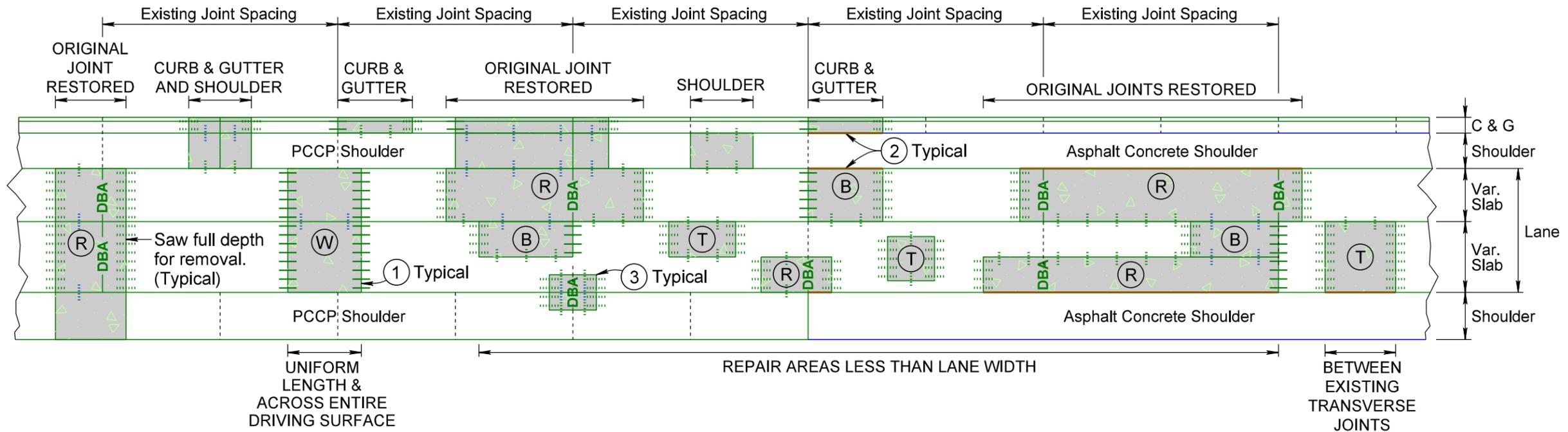
PLOTTED FROM - TRMLINT15

NONREINFORCED PCC PAVEMENT REPAIR

ANY SINGLE LANE ROADWAY (RAMPS, ETC.) TYPICAL REPAIR AREAS

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	0009-271	26	47

Plotting Date: 03/30/2022



KEY:

PCC Pavement Repair Area

PCC PAVEMENT REPAIR AREA TYPES:

- (W) Two Working Joints (Use only if repair is full roadway width and uniform length (across entire driving surface))
- (T) Two Tied Joints
- (B) One Working & One Tied Joint
- (R) Two Tied Joints with Original Joint Restored with Dowel Bar Assembly

Steel Bars for Transverse Joints

Pavement Thickness ≥ 10.5 "

— Drilled in $1\frac{1}{2}$ " x 18" epoxy coated plain round dowel bars spaced 18" center to center.

..... Drilled in No. 11 x 18" epoxy coated deformed tie bars spaced 18" center to center.

Pavement Thickness ≥ 8.5 " and < 10.5 "

— Drilled in $1\frac{1}{4}$ " x 18" epoxy coated plain round dowel bars spaced 18" center to center.

..... Drilled in No. 9 x 18" epoxy coated deformed tie bars spaced 18" center to center.

Pavement Thickness < 8.5 "

— Drilled in 1" x 18" epoxy coated plain round dowel bars spaced 18" center to center.

..... Drilled in No. 8 x 18" epoxy coated deformed tie bars spaced 18" center to center.

DBA Dowel Bar Assembly

Steel Bars for Longitudinal Joints

..... No. 5 x 30" epoxy coated deformed tie bars. Sawed Joint - spaced 48" center to center. Construction Joint - spaced 48" center to center.

..... No. 5 x 24" epoxy coated deformed tie bars. Drilled In - spaced 30" center to center.

NOTES: Saw around repair areas full depth for removal.

- ① Where possible, transverse joints will be constructed/maintained full roadway width.
- ② Edges of repair areas will be formed to match the width of the existing concrete pavement.
- ③ Need for bars in small repair areas on/near the shoulder to be determined on a case-by-case basis, on construction by the Engineer.

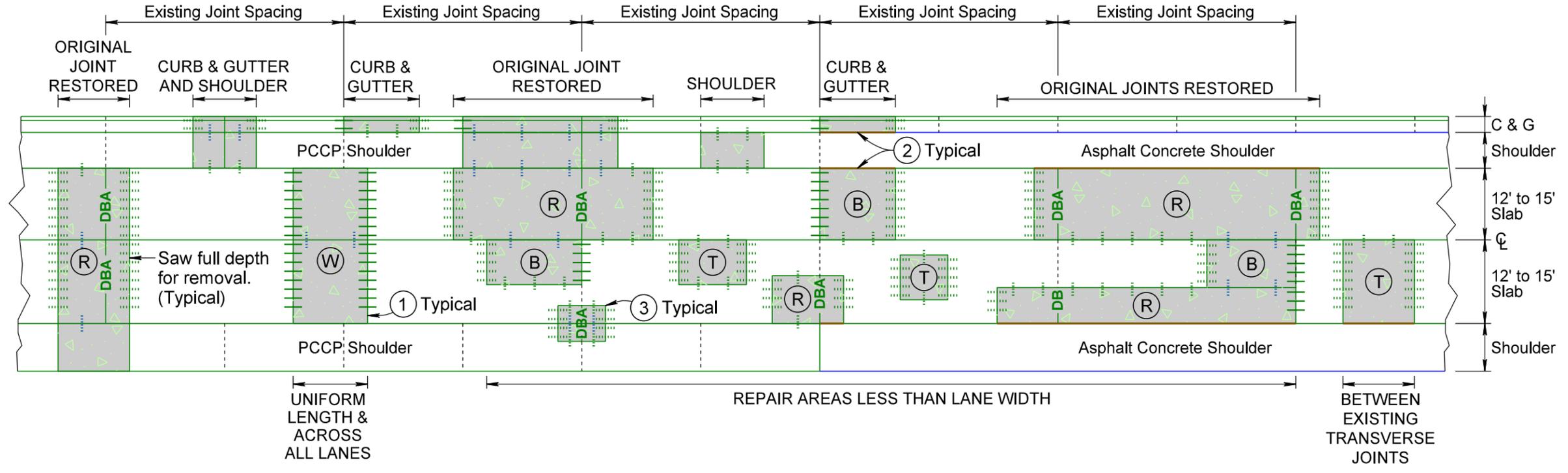
NONREINFORCED PCC PAVEMENT REPAIR

UP TO TWO LANE ROADWAY OR UP TO FOUR LANE DIVIDED ROADWAY

TYPICAL REPAIR AREAS

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	0009-271	27	47

Plotting Date: 03/30/2022



KEY:

PCC Pavement Repair Area

PCC PAVEMENT REPAIR AREA TYPES:

- (W) Two Working Joints (Use only if repair is full roadway width and uniform length (across all lanes))
- (T) Two Tied Joints
- (B) One Working & One Tied Joint
- (R) Two Tied Joints with Original Joint Restored with Dowel Bar Assembly

Steel Bars for Transverse Joints

- Pavement Thickness ≥ 10.5 "
 - Drilled in $1\frac{1}{2}$ " x 18" epoxy coated plain round dowel bars spaced 18" center to center.
 - Drilled in No. 11 x 18" epoxy coated deformed tie bars spaced 18" center to center.
- Pavement Thickness ≥ 8.5 " and < 10.5 "
 - Drilled in $1\frac{1}{4}$ " x 18" epoxy coated plain round dowel bars spaced 18" center to center.
 - Drilled in No. 9 x 18" epoxy coated deformed tie bars spaced 18" center to center.
- Pavement Thickness < 8.5 "
 - Drilled in 1" x 18" epoxy coated plain round dowel bars spaced 18" center to center.
 - Drilled in No. 8 x 18" epoxy coated deformed tie bars spaced 18" center to center.

DBA Dowel Bar Assembly

Steel Bars for Longitudinal Joints

- No. 5 x 30" epoxy coated deformed tie bars. Sawn Joint - spaced 48" center to center. Construction Joint - spaced 48" center to center.
- No. 5 x 24" epoxy coated deformed tie bars. Drilled In - spaced 30" center to center.

NOTES: Saw around repair areas full depth for removal.

- ① Where possible, transverse joints will be constructed/maintained full roadway width.
- ② Edges of repair areas will be formed to match the width of the existing concrete pavement.
- ③ Need for bars in small repair areas on/near the shoulder to be determined on a case-by-case basis, on construction by the Engineer.

PLOT SCALE - 1:10

PLOT NAME - 14

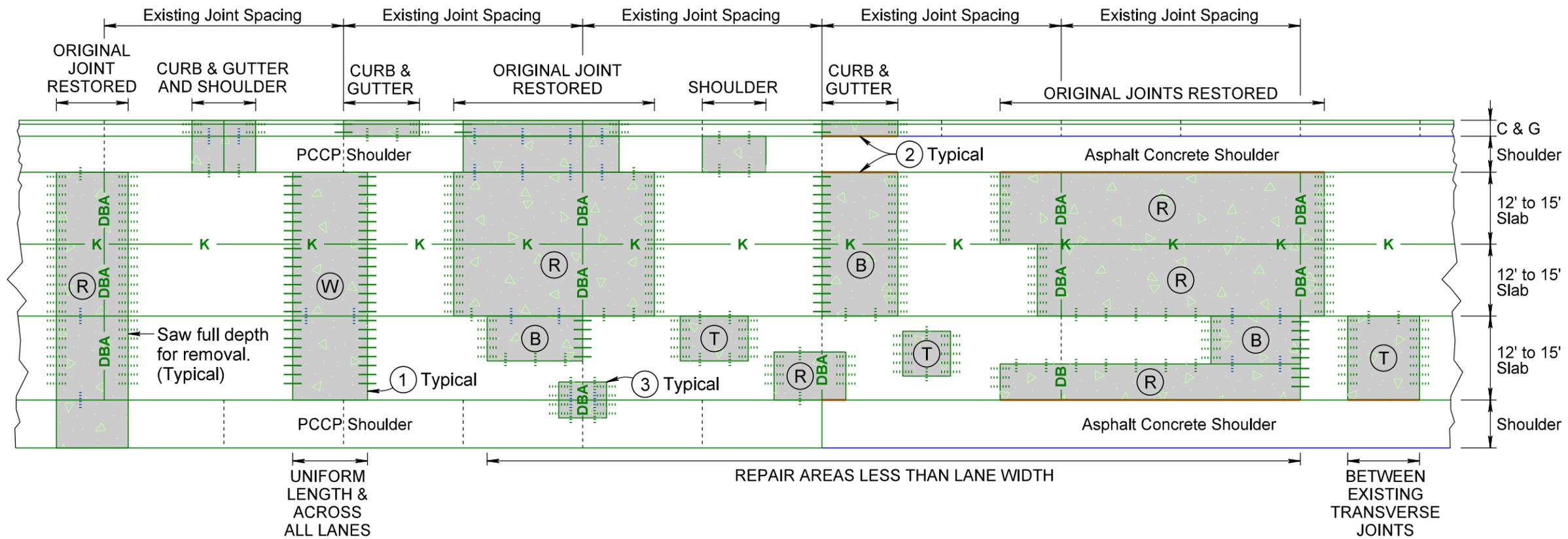
FILE - ... \PATCH2.DGN

PLOTTED FROM - TRMLINT15

NONREINFORCED PCC PAVEMENT REPAIR

UP TO TWO LANE ROADWAY WITH CENTER LANE OR UP TO SIX LANE DIVIDED ROADWAY TYPICAL REPAIR AREAS

Plotting Date: 03/30/2022



KEY:

PCC Pavement Repair Area

PCC PAVEMENT REPAIR AREA TYPES:

(W) Two Working Joints (Use only if repair is full roadway width and uniform length (across all lanes))

(T) Two Tied Joints

(B) One Working & One Tied Joint

(R) Two Tied Joints with Original Joint Restored with Dowel Bar Assembly

Longitudinal Keyway Joints Without Bars

— K — Where a repair area intersects an existing longitudinal keyway joint without tie bars, the newly constructed joint should also be a keyway without tie bars.

Steel Bars for Transverse Joints

Pavement Thickness ≥ 10.5 "

— Drilled in $1\frac{1}{2}$ " x 18" epoxy coated plain round dowel bars spaced 18" center to center.

..... Drilled in No. 11 x 18" epoxy coated deformed tie bars spaced 18" center to center.

Pavement Thickness ≥ 8.5 " and < 10.5 "

— Drilled in $1\frac{1}{4}$ " x 18" epoxy coated plain round dowel bars spaced 18" center to center.

..... Drilled in No. 9 x 18" epoxy coated deformed tie bars spaced 18" center to center.

Pavement Thickness < 8.5 "

— Drilled in 1" x 18" epoxy coated plain round dowel bars spaced 18" center to center.

..... Drilled in No. 8 x 18" epoxy coated deformed tie bars spaced 18" center to center.

DBA Dowel Bar Assembly

Steel Bars for Longitudinal Joints

..... No. 5 x 30" epoxy coated deformed tie bars. Sawn Joint - spaced 48" center to center. Construction Joint - spaced 48" center to center.

..... No. 5 x 24" epoxy coated deformed tie bars. Drilled In - spaced 30" center to center.

NOTES: Saw around repair areas full depth for removal.

① Where possible, transverse joints will be constructed/maintained full roadway width.

② Edges of repair areas will be formed to match the width of the existing concrete pavement.

③ Need for bars in small repair areas on/near the shoulder to be determined on a case-by-case basis, on construction by the Engineer.

PLOT SCALE - 1:10

PLOT NAME - 15

FILE - ... \PATCH3.DGN

PLOTTED FROM - TRMLINT15

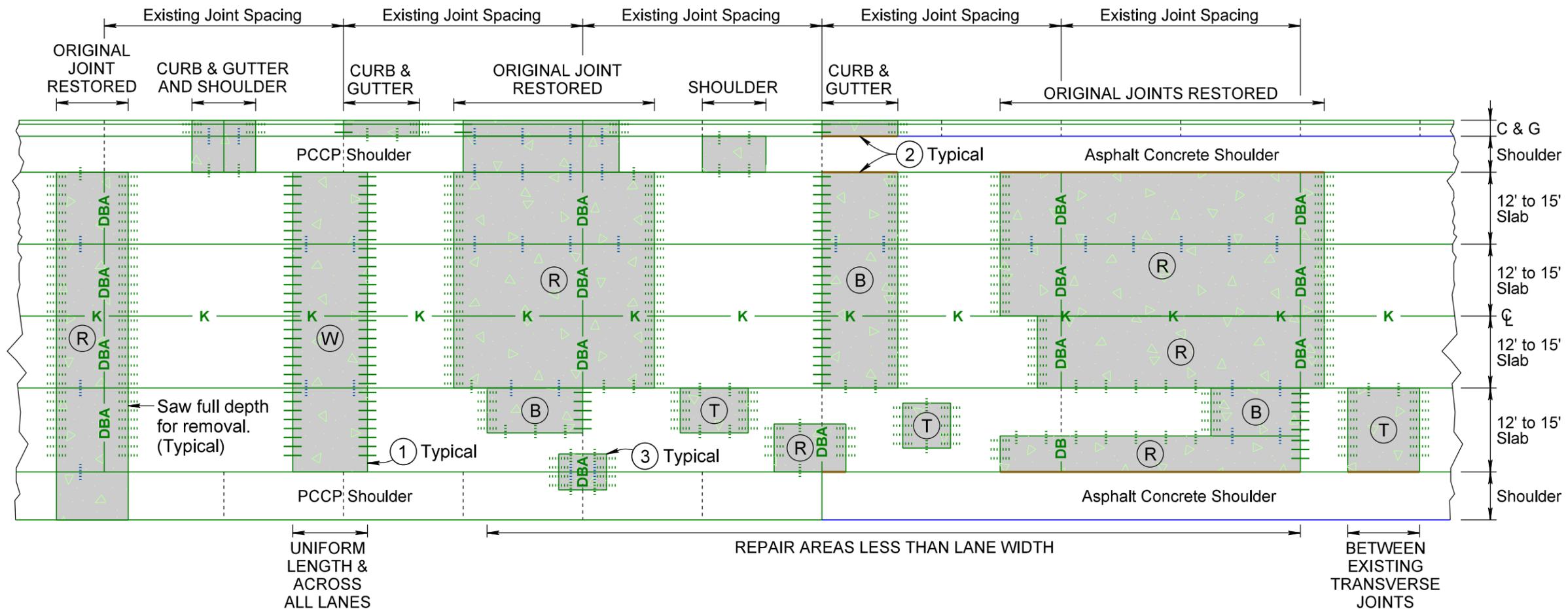
NONREINFORCED PCC PAVEMENT REPAIR

UP TO FOUR LANE ROADWAY OR UP TO EIGHT LANE DIVIDED ROADWAY

TYPICAL REPAIR AREAS

STATE OF SOUTH DAKOTA	PROJECT 0009-271	SHEET 29	TOTAL SHEETS 47
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Plotting Date: 03/30/2022



KEY:

PCC Pavement Repair Area

PCC PAVEMENT REPAIR AREA TYPES:

(W) Two Working Joints (Use only if repair is full roadway width and uniform length (across all lanes))

(T) Two Tied Joints

(B) One Working & One Tied Joint

(R) Two Tied Joints with Original Joint Restored with Dowel Bar Assembly

Longitudinal Keyway Joints Without Bars

— K — Where a repair area intersects an existing longitudinal keyway joint without tie bars, the newly constructed joint should also be a keyway without tie bars.

Steel Bars for Transverse Joints

Pavement Thickness ≥ 10.5 "

— Drilled in $1\frac{1}{2}$ " x 18" epoxy coated plain round dowel bars spaced 18" center to center.

..... Drilled in No. 11 x 18" epoxy coated deformed tie bars spaced 18" center to center.

Pavement Thickness ≥ 8.5 " and < 10.5 "

— Drilled in $1\frac{1}{4}$ " x 18" epoxy coated plain round dowel bars spaced 18" center to center.

..... Drilled in No. 9 x 18" epoxy coated deformed tie bars spaced 18" center to center.

Pavement Thickness < 8.5 "

— Drilled in 1" x 18" epoxy coated plain round dowel bars spaced 18" center to center.

..... Drilled in No. 8 x 18" epoxy coated deformed tie bars spaced 18" center to center.

DBA Dowel Bar Assembly

Steel Bars for Longitudinal Joints

..... No. 5 x 30" epoxy coated deformed tie bars. Sawn Joint - spaced 48" center to center. Construction Joint - spaced 48" center to center.

..... No. 5 x 24" epoxy coated deformed tie bars. Drilled In - spaced 30" center to center.

NOTES: Saw around repair areas full depth for removal.

(1) Where possible, transverse joints will be constructed/maintained full roadway width.

(2) Edges of repair areas will be formed to match the width of the existing concrete pavement.

(3) Need for bars in small repair areas on/near the shoulder to be determined on a case-by-case basis, on construction by the Engineer.

PLOT SCALE - 1:10

PLOT NAME - 16

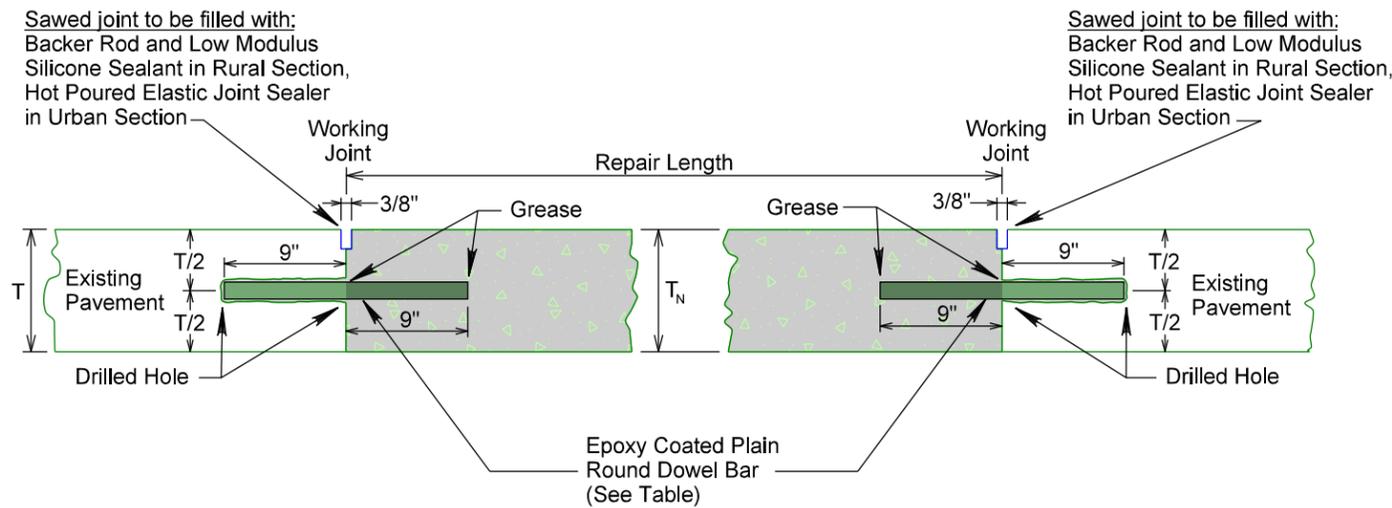
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PLOTTED FROM - TRMLINT15

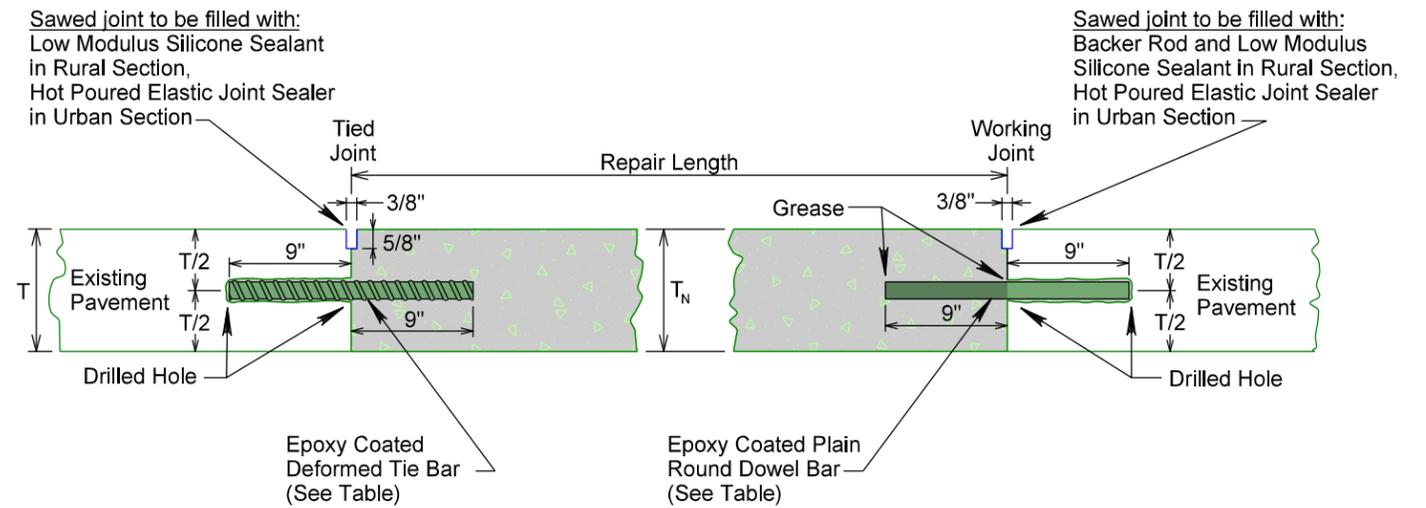
NONREINFORCED PCC PAVEMENT REPAIR

Plotting Date: 03/30/2022

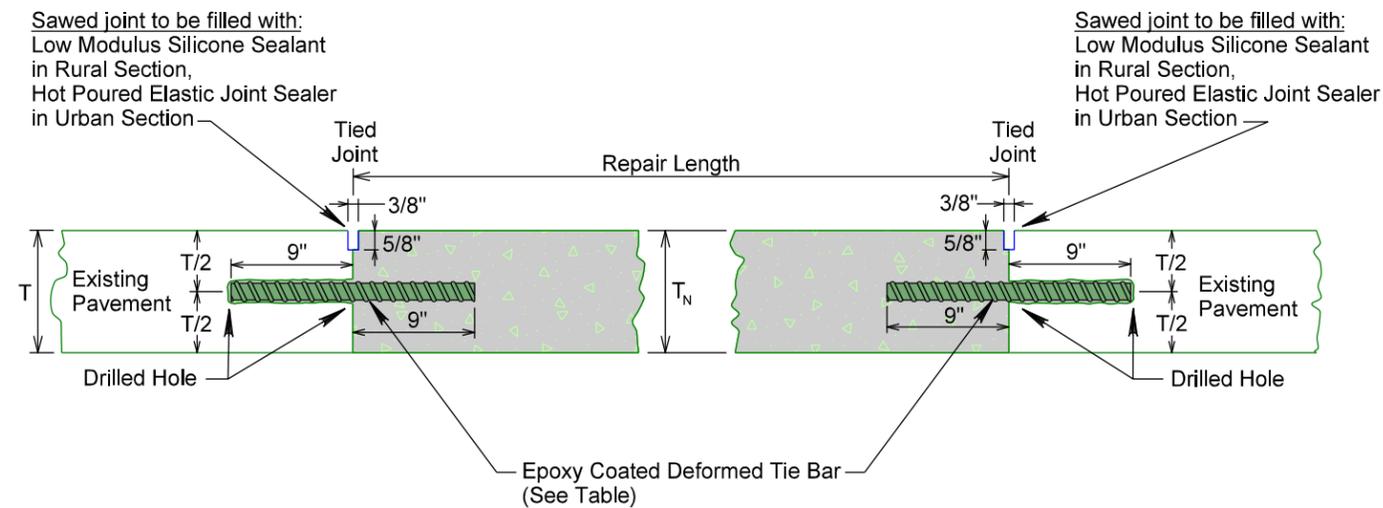
**PLAIN ROUND DOWEL BAR INSERTION
TYPE W - (TWO WORKING JOINTS)**



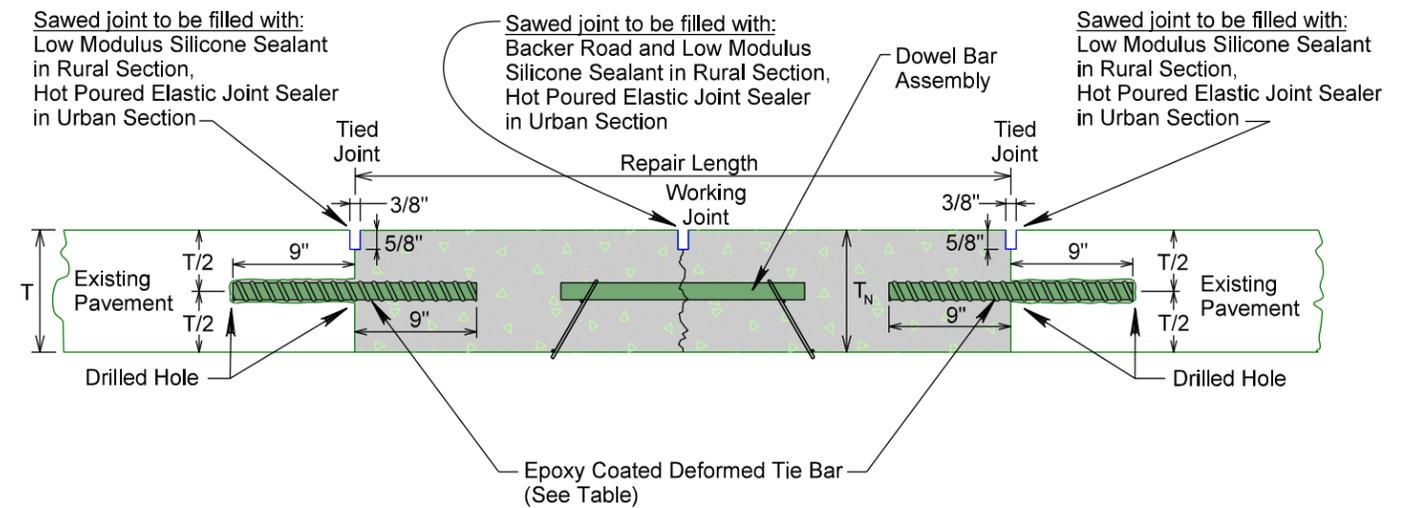
**DEFORMED TIE BAR AND PLAIN ROUND DOWEL BAR INSERTION
TYPE B - (ONE TIED JOINT AND ONE WORKING JOINT)**



**DEFORMED TIE BAR INSERTION
TYPE T - (TWO TIED JOINTS)**



**DEFORMED TIE BAR INSERTION WITH DOWEL BAR ASSEMBLY
TYPE R - (TWO TIED JOINTS AND ONE WORKING JOINT - ORIGINAL JOINT RESTORED)**



Existing Pavement Thickness	Epoxy Coated Deformed Tie Bar Size	Epoxy Coated Plain Round Dowel Bar Size
T ≥ 10.5"	No. 11 x 18"	1½" x 18"
T ≥ 8.5" & T < 10.5"	No. 9 x 18"	1¼" x 18"
T < 8.5"	No. 8 x 18"	1" x 18"

T = Existing pavement thickness.
T_N = New pavement thickness.

Bar embedded to a minimum depth of 9 inches into the existing pavement by utilizing an epoxy resin adhesive.

Cost for furnishing and inserting steel bars (deformed tie and plain round dowel) will be included in the contract unit price per each for Insert Steel Bar in PCC Pavement.

Cost for furnishing and installing dowel bar assembly will be included in the contract unit price per each for Dowel Bar.

T_N = T
(top of new pavement will be flush with top of existing pavement)

PLOT SCALE - 1/4"=1'-0"

PLOTTED FROM - TRMLINT15

PLOT NAME -

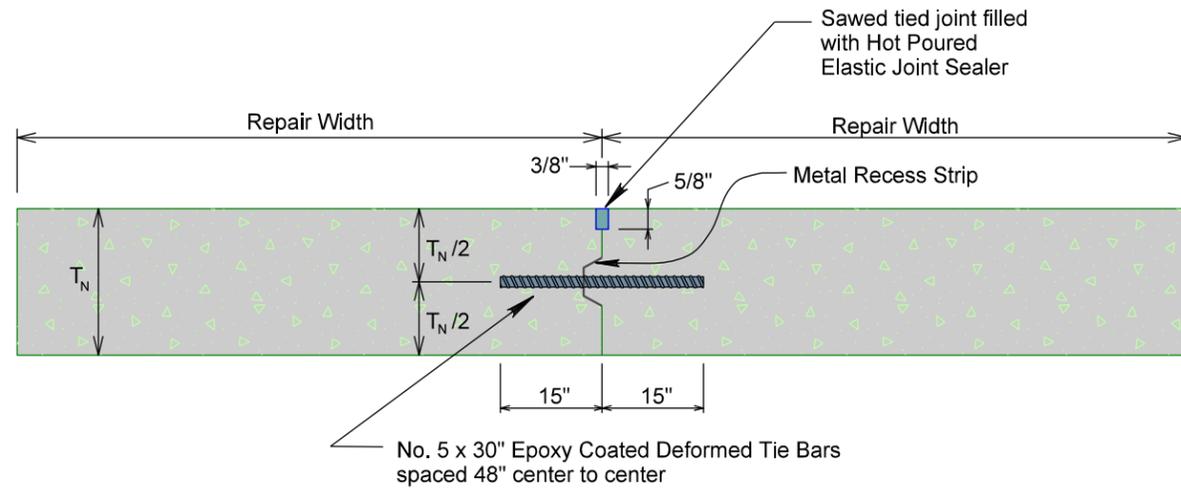
FILE - ... \SFAREA16LU (ON CALL) \BARS.DGN

NONREINFORCED PCC PAVEMENT REPAIR

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	0009-271	31	47

Plotting Date: 03/30/2022

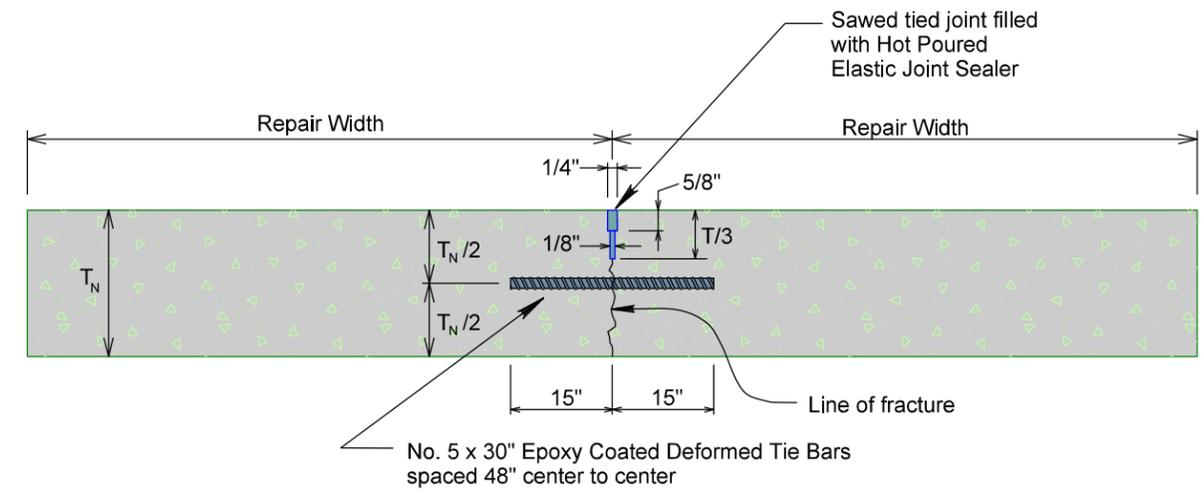
LONGITUDINAL CONSTRUCTION JOINT WITH TIE BARS & KEYWAY



T_N = New pavement thickness.

Cost for furnishing and inserting tie bars will be incidental to the contract unit price per square yard for Nonreinforced PCC Pavement Repair.

SAWED LONGITUDINAL JOINT

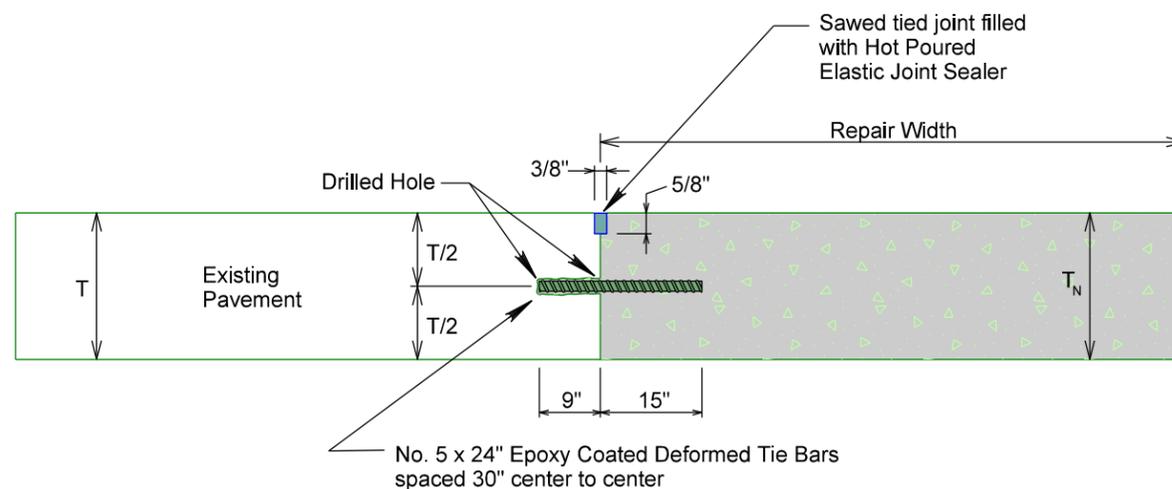


T_N = New pavement thickness.

The first saw cut to control cracking will be a minimum of 1/3 the depth of the pavement. Additional sawing for widening the saw cut will be necessary.

Cost for furnishing and inserting tie bars will be incidental to the contract unit price per square yard for Nonreinforced PCC Pavement Repair.

LONGITUDINAL CONSTRUCTION JOINT WITH DRILLED IN TIE BARS



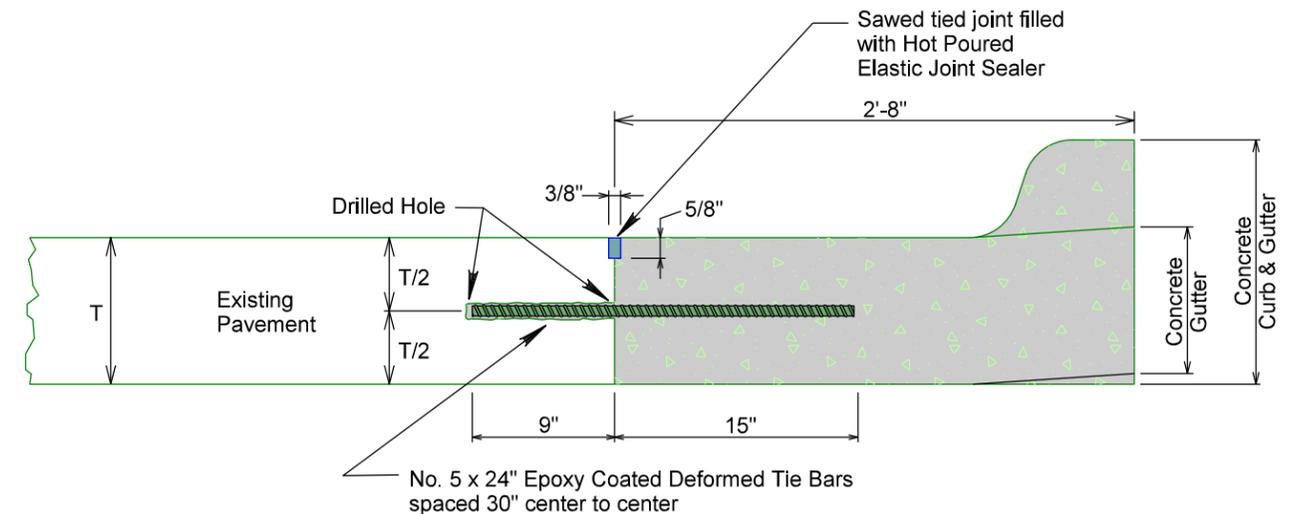
T = Existing pavement thickness.
 T_N = New pavement thickness.

Bar embedded a minimum depth of 9 inches into the existing pavement by utilizing an epoxy resin adhesive.

Bars will be placed a minimum of 15 inches from existing transverse contraction joints.

Cost for furnishing and inserting drilled in tie bars will be included in the contract unit price per each for Insert Steel Bar in PCC Pavement.

LONGITUDINAL CONSTRUCTION JOINT WITH DRILLED IN TIE BARS



T = Existing pavement thickness.

Bar embedded a minimum depth of 9 inches into the existing pavement by utilizing an epoxy resin adhesive.

Bars will be placed a minimum of 15 inches from existing transverse contraction joints.

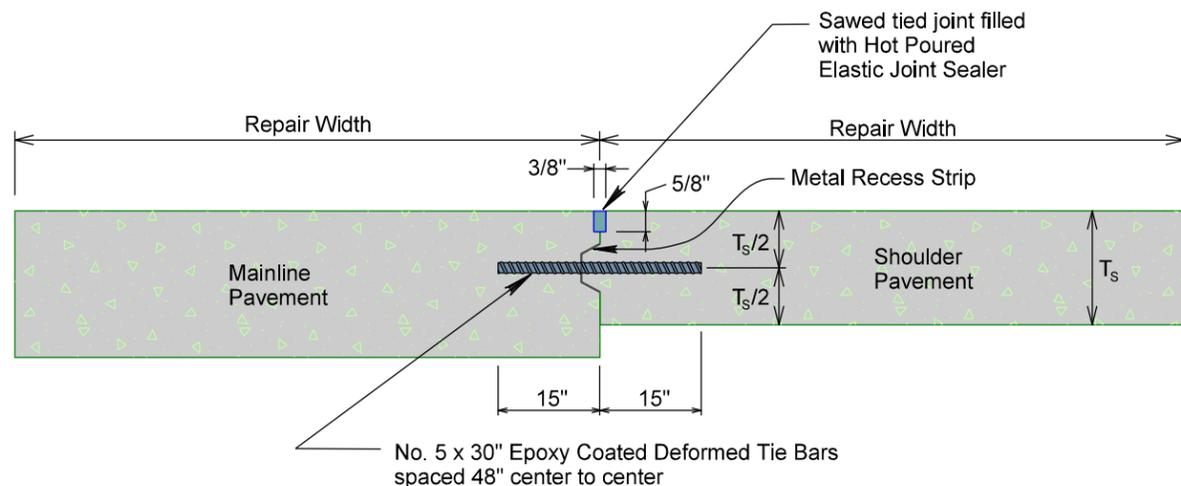
Cost for furnishing and inserting drilled in tie bars will be included in the contract unit price per each for Insert Steel Bar in PCC Pavement.

NONREINFORCED PCC PAVEMENT REPAIR

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	0009-271	32	47

Plotting Date: 03/30/2022

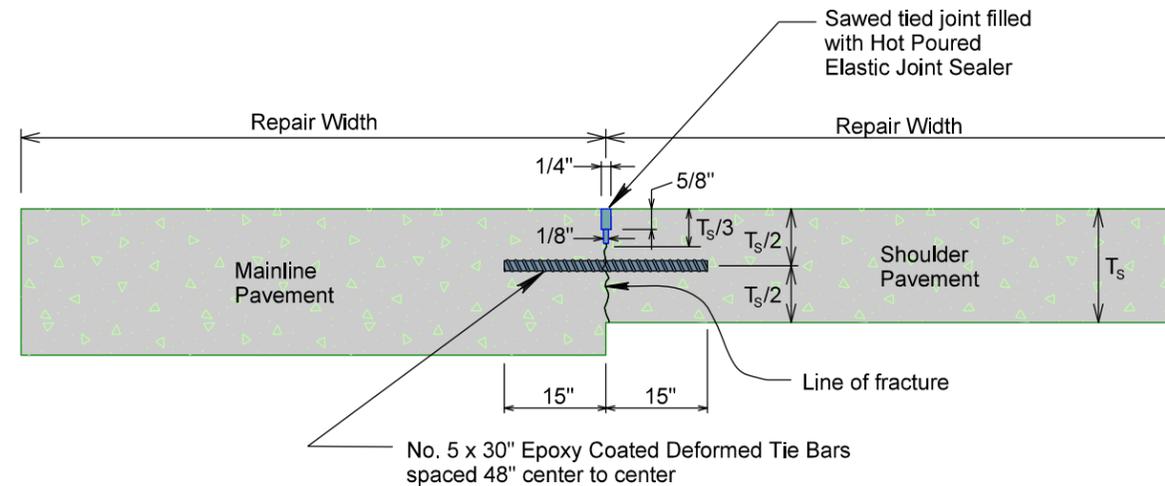
LONGITUDINAL SHOULDER CONSTRUCTION JOINT WITH TIE BARS & KEYWAY



T_s = New shoulder pavement thickness.

Cost for furnishing and inserting tie bars will be incidental to the contract unit price per square yard for Nonreinforced PCC Pavement Repair.

SAWED LONGITUDINAL SHOULDER JOINT

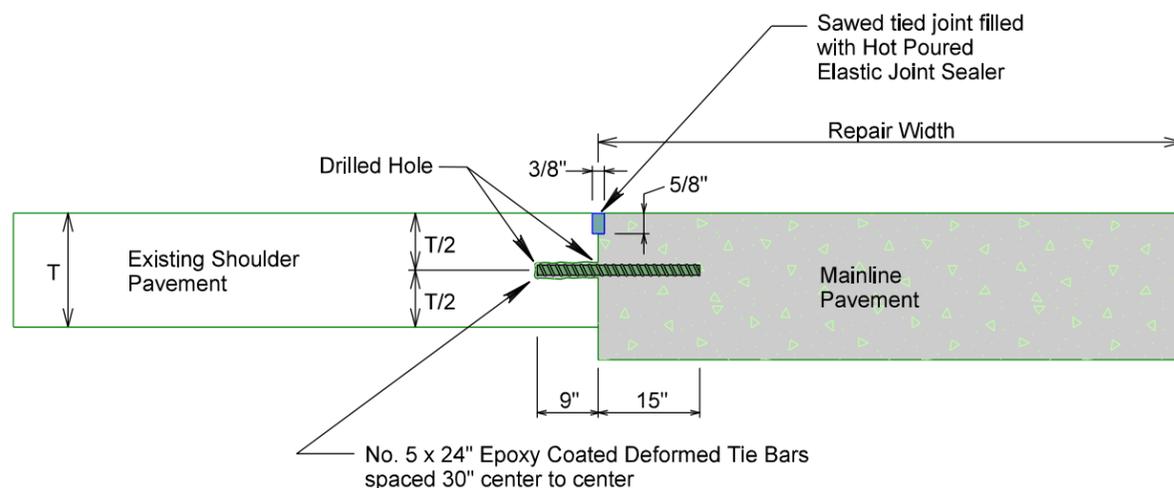


T_s = New shoulder pavement thickness.

The first saw cut to control cracking will be a minimum of 1/3 the depth of the pavement. Additional sawing for widening the saw cut will be necessary.

Cost for furnishing and inserting tie bars will be incidental to the contract unit price per square yard for Nonreinforced PCC Pavement Repair.

LONGITUDINAL SHOULDER JOINT WITH DRILLED IN TIE BARS



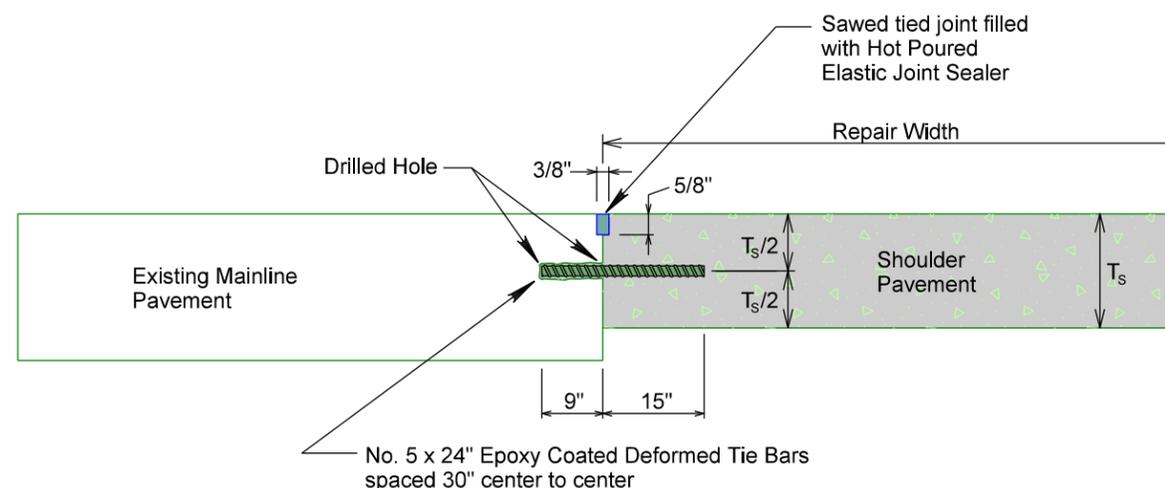
T = Existing shoulder pavement thickness.

Bar embedded a minimum depth of 9 inches into the existing pavement by utilizing an epoxy resin adhesive.

Bars will be placed a minimum of 15 inches from existing transverse contraction joints.

Cost for furnishing and inserting drilled in tie bars will be included in the contract unit price per each for Insert Steel Bar in PCC Pavement.

LONGITUDINAL SHOULDER JOINT WITH DRILLED IN TIE BARS



T_s = New shoulder pavement thickness.

Bar embedded a minimum depth of 9 inches into the existing pavement by utilizing an epoxy resin adhesive.

Bars will be placed a minimum of 15 inches from existing transverse contraction joints.

Cost for furnishing and inserting drilled in tie bars will be included in the contract unit price per each for Insert Steel Bar in PCC Pavement.

PLOT SCALE - 1:11.25

PLOTTED FROM - IRMLINT15

PLOT NAME - 19 FILE - ... \SFAREA16LU (ON CALL) \BARS.DGN

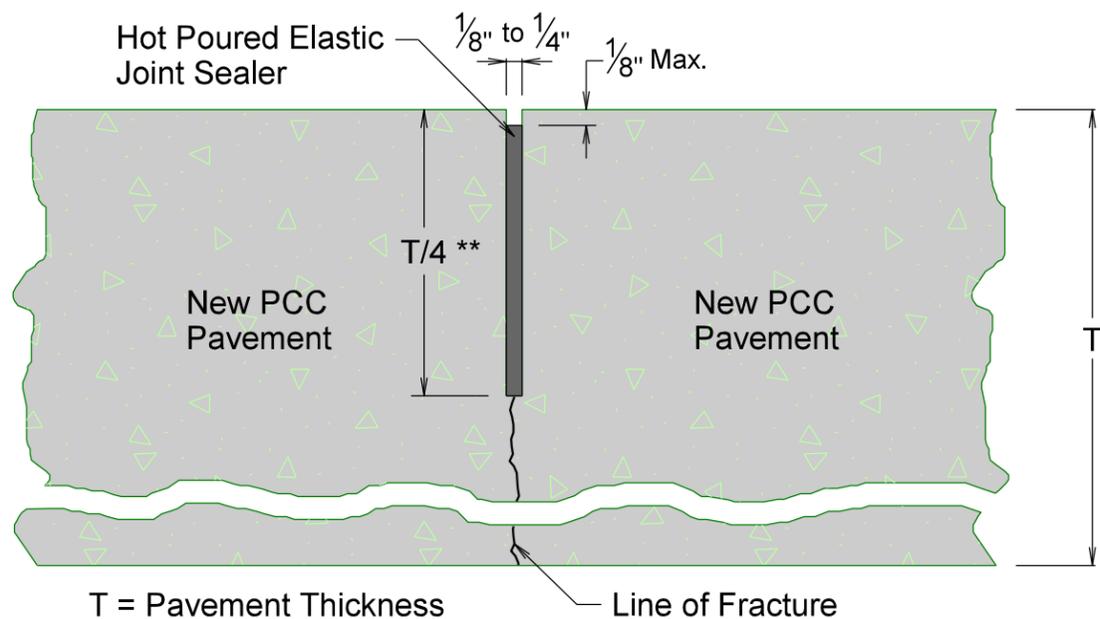
NONREINFORCED PCC PAVEMENT REPAIR

SAW & SEAL TRANSVERSE JOINTS

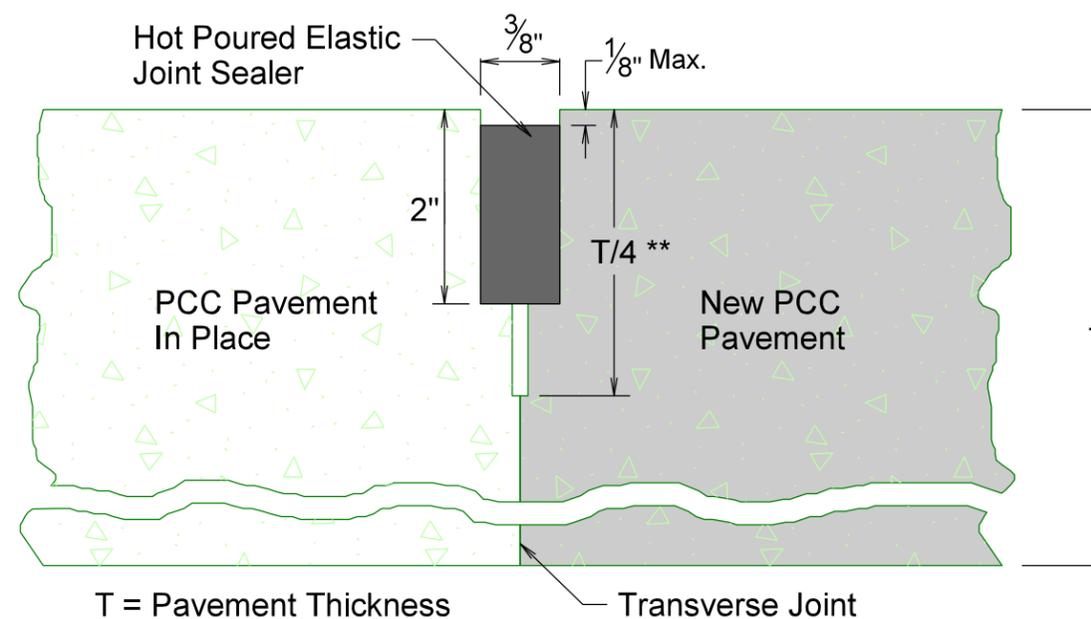
STATE OF SOUTH DAKOTA	PROJECT 0009-271	SHEET 33	TOTAL SHEETS 47
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Plotting Date: 03/30/2022

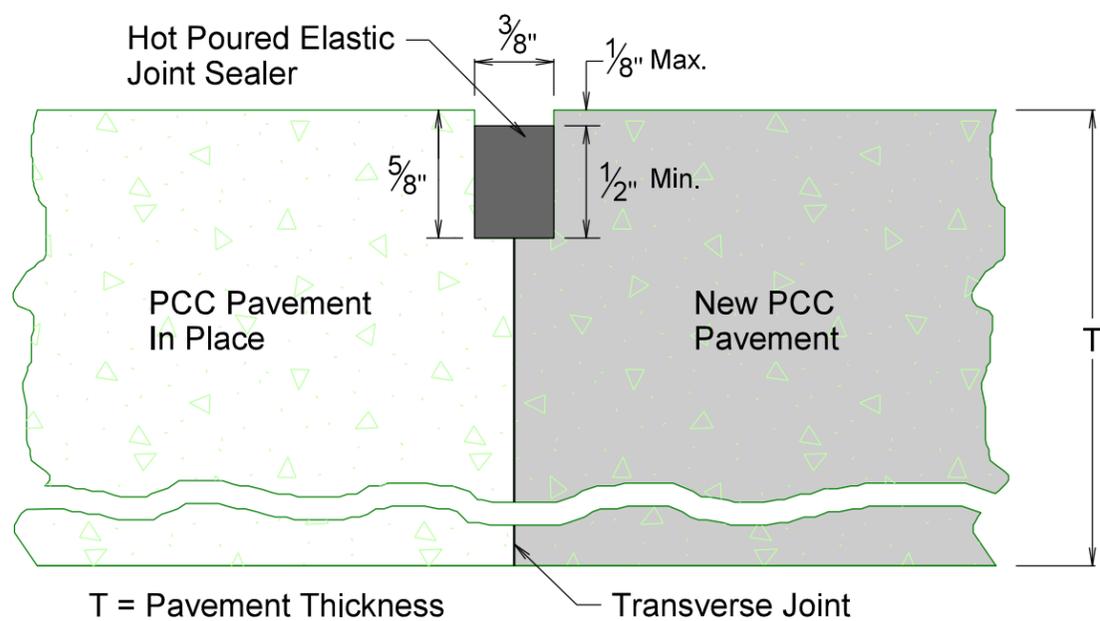
WITH HOT Poured ELASTIC JOINT SEALER AT WORKING JOINTS ENTIRELY WITHIN REPAIR AREAS



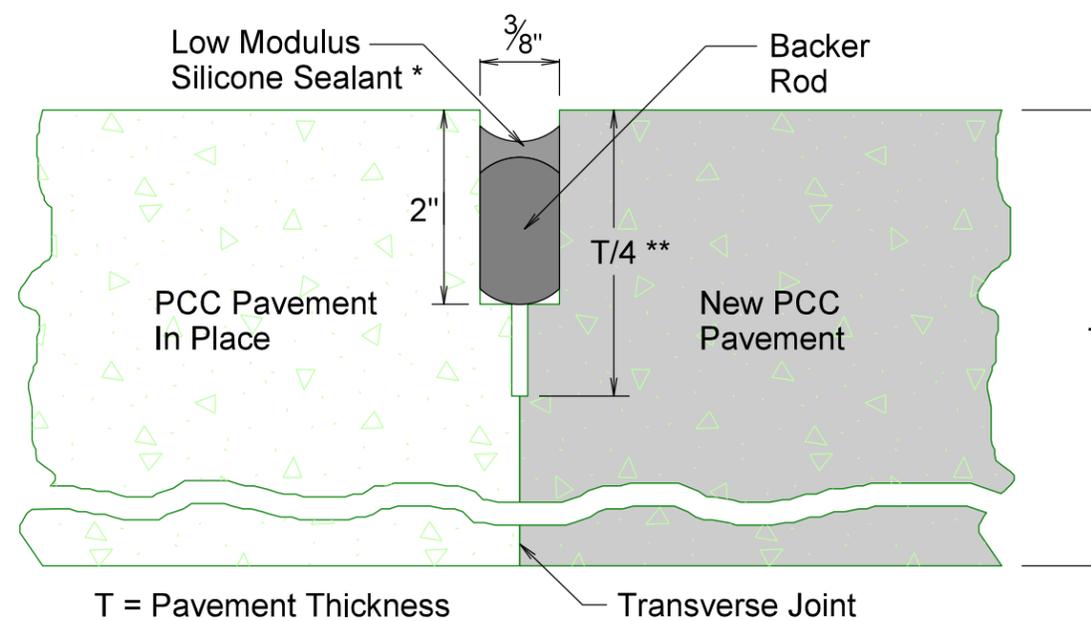
WITH HOT Poured ELASTIC JOINT SEALER AT WORKING JOINTS (TYPICALLY URBAN)



WITH HOT Poured ELASTIC JOINT SEALER AT TIED JOINTS



WITH LOW MODULUS SILICONE SEALANT AT WORKING JOINTS (TYPICALLY RURAL)



* Refer to Standard Plate 380.13 for installation details using Joint Width J=3/8".

** The saw cut to control cracking will be a minimum of 1/4 the thickness of the pavement.

PLOT SCALE - 1:0.12

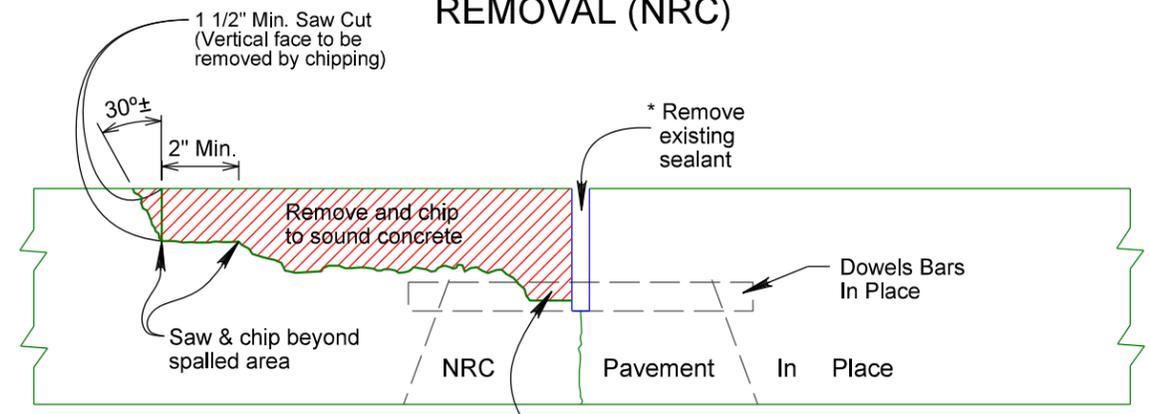
PLOTTED FROM - TRMLINT15

PLOT NAME - 20

FILE - ... \REPAIR AREA - TRANSVERSE JOINT DETAILS.DGN

REPAIR OF TYPE A SPALLS

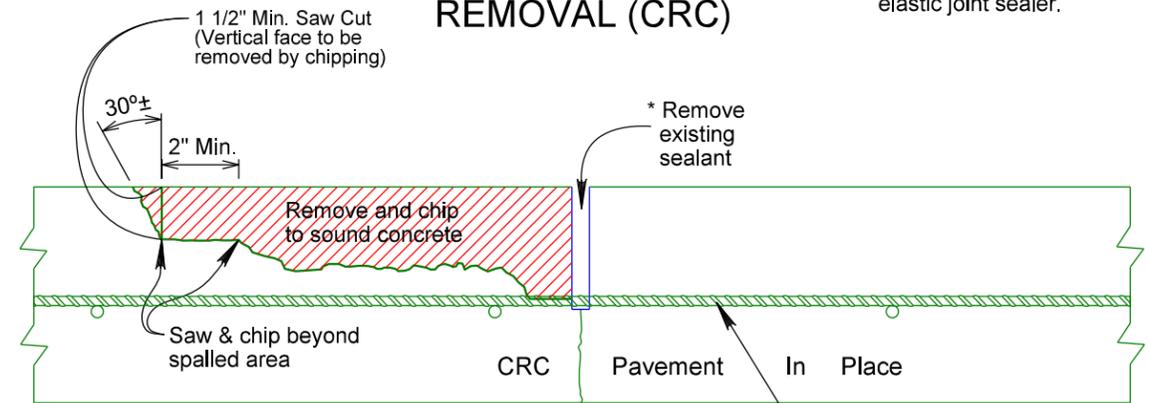
REMOVAL (NRC)



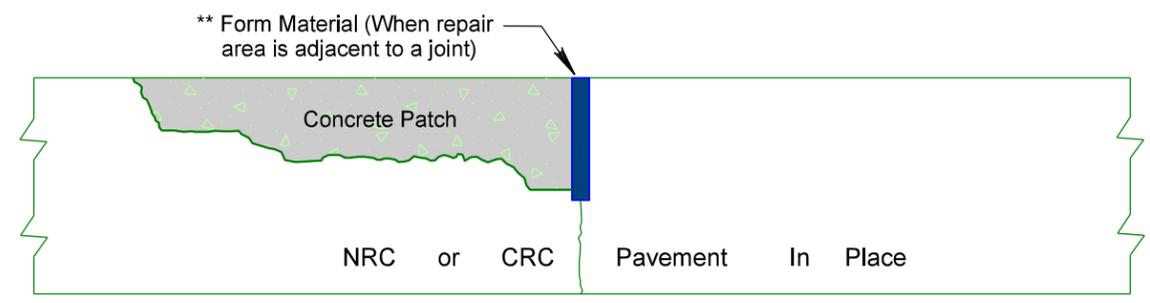
If Dowel Bar is exposed coat the bar with duct tape as a bond breaker

* Existing Sealant to be removed is low modulus silicone sealant with backer rod or hot poured elastic joint sealer.

REMOVAL (CRC)



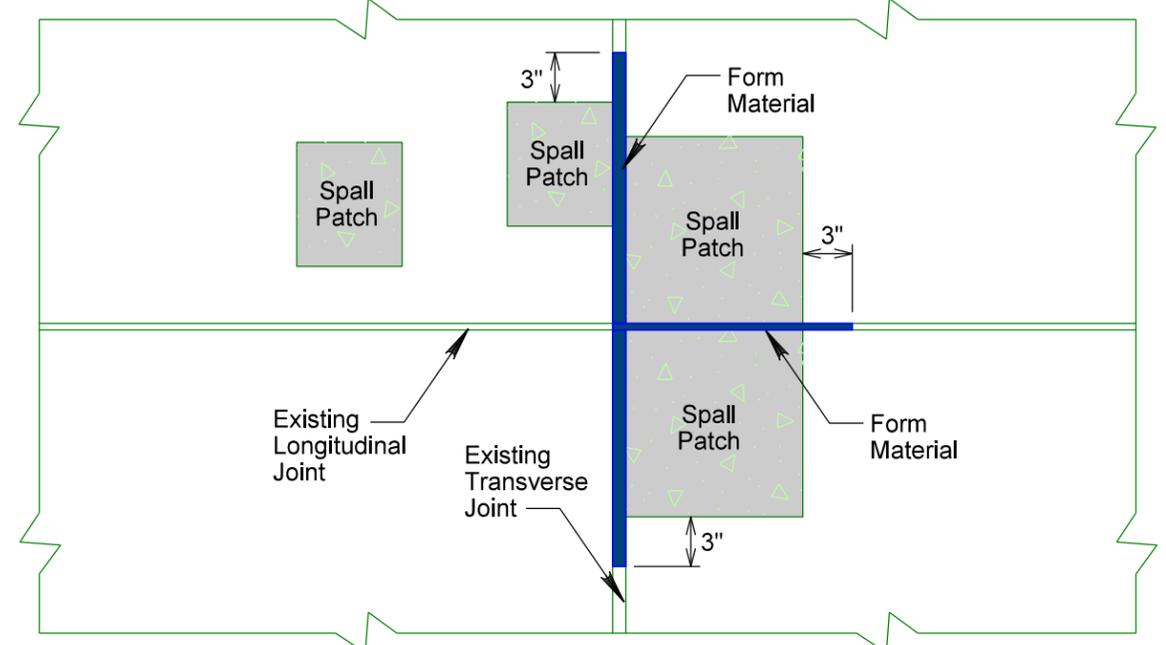
PATCHING



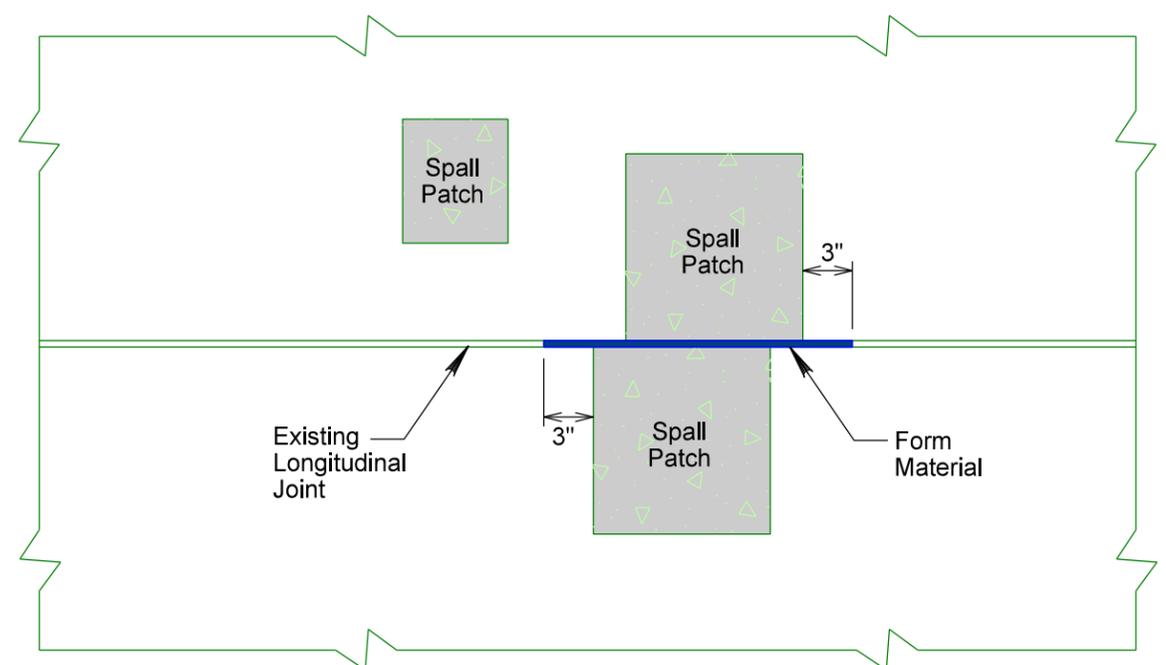
** Form Material will be removed by sawing or other means approved by the Engineer. Spall repaired joints will then be sealed with Backer Rod and Low Modulus Silicone Sealant.

REPAIR OF TYPE A SPALLS

NRC SPALL PATCHES (PLAN VIEW)



CRC SPALL PATCHES (PLAN VIEW)



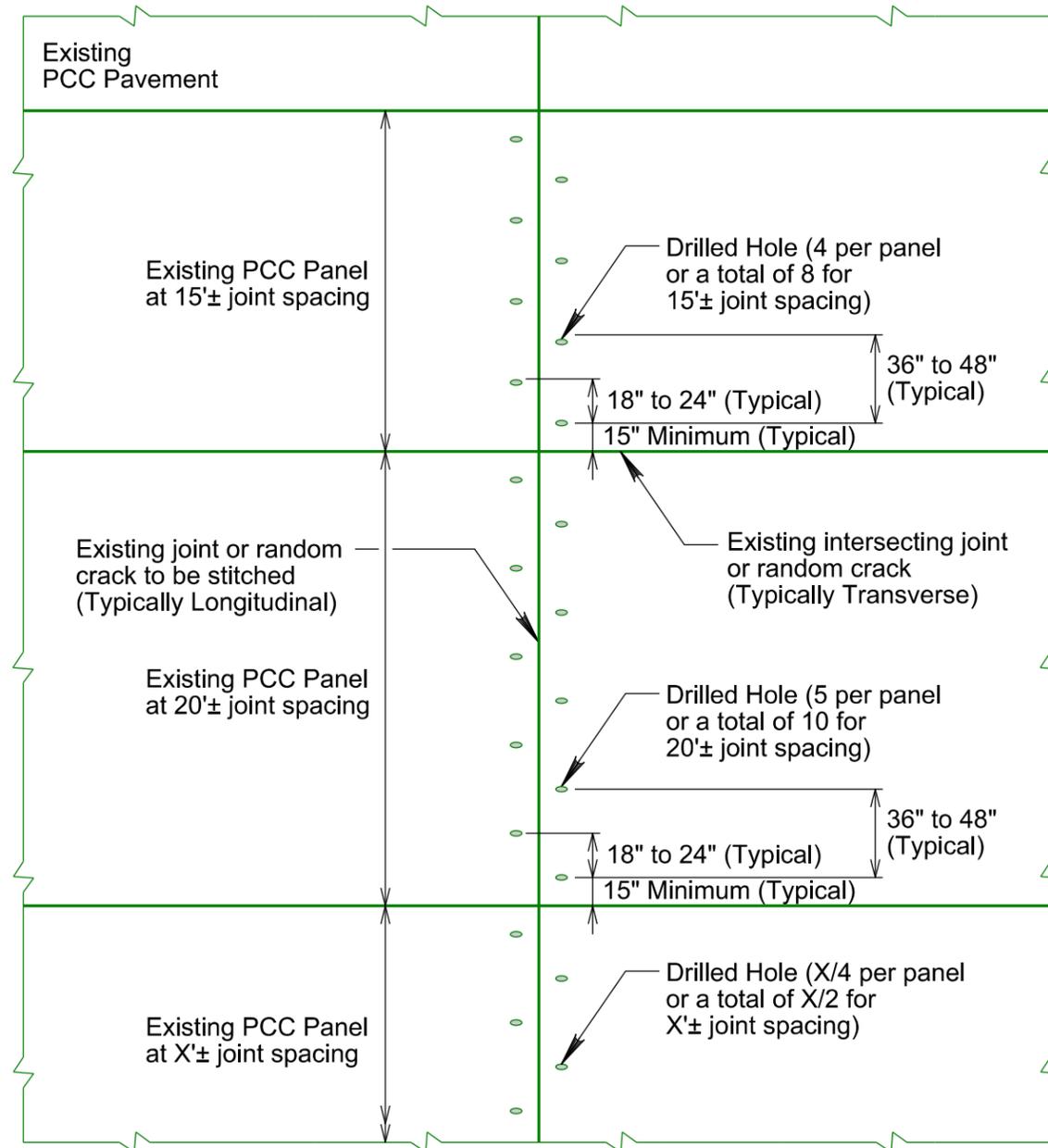
PLOT SCALE - 1:10

PLOTTED FROM - IRMLINT15

PLOT NAME - 21

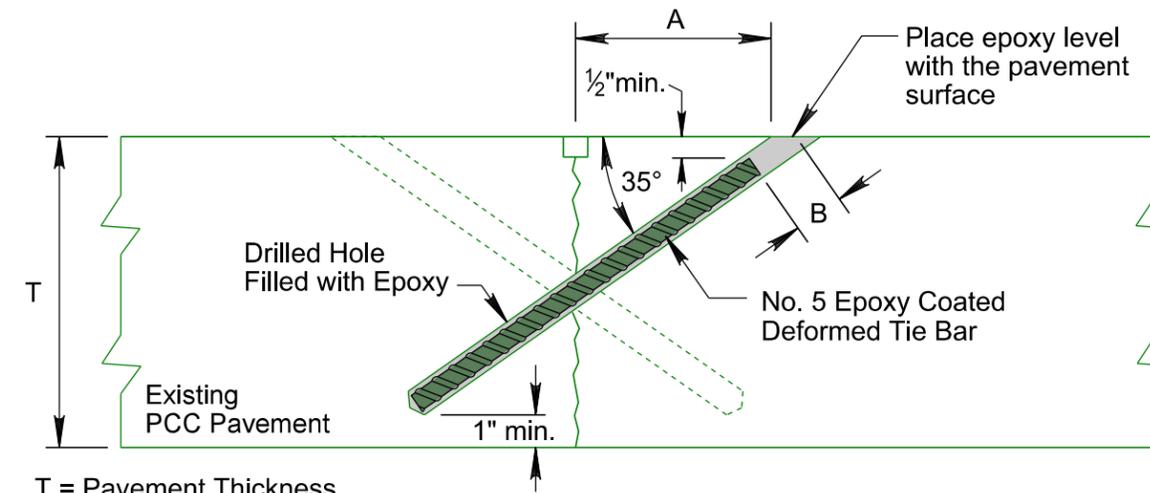
FILE - ... \SFAREA16LU (ON CALL) \SPALL.DGN

TIE BAR RETROFIT (STITCHING)



PLAN VIEW

TIE BAR RETROFIT (STITCHING)



T = Pavement Thickness

ELEVATION VIEW

TABLE OF STITCHING DIMENSIONS

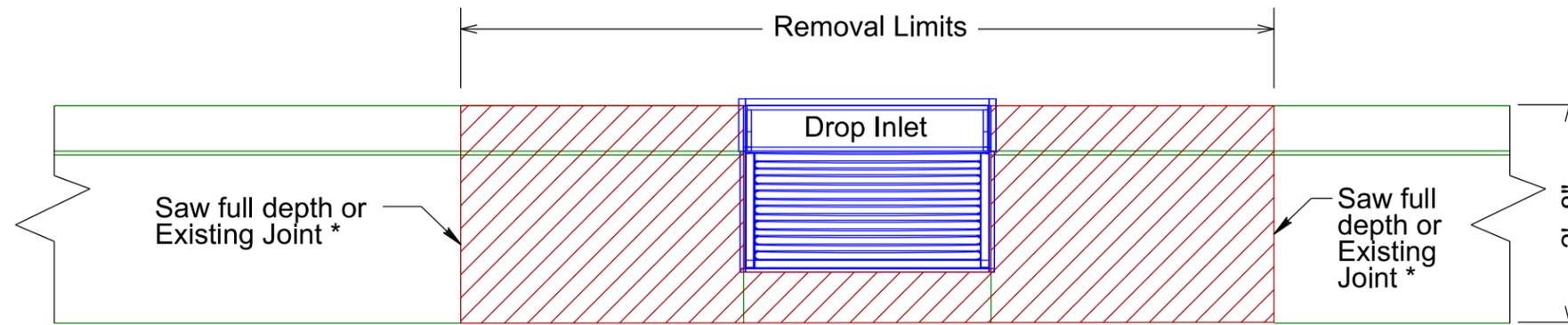
T	A	B	Length of Tie Bar
8"	5"	1½"±	10"
8½"	5¼"	1¾"±	11"
9"	5⅝"	1¼"±	12"
9½"	6"	1⅝"±	12½"
10"	6¾"	1½"±	13½"
10½"	6¾"	1¾"±	14½"
11"	7"	1¼"±	15½"
11½"	7¾"	1¾"±	16"
12"	7¾"	1¾"±	16½"
12½"	8⅛"	1¼"±	17½"

Stitch Bar Spacing 24" Max.

Joint Spacing	Number of Bars
3' to 4.5'	2
5' to 6.5'	3
7' to 8.5'	4
9' to 10.5'	5
11' to 12.5'	6
13' to 14.5'	7
15' to 16.5'	8
17' to 18.5'	9
19' to 20.5'	10
21 to 22.5'	11
23' to 24.5'	12
25' to 26.5'	13
27' to 28.5'	14
29' to 30.5'	15

LAYOUT FOR REPAIR CONCRETE CURB AND/OR GUTTER ADJACENT TO DROP INLET

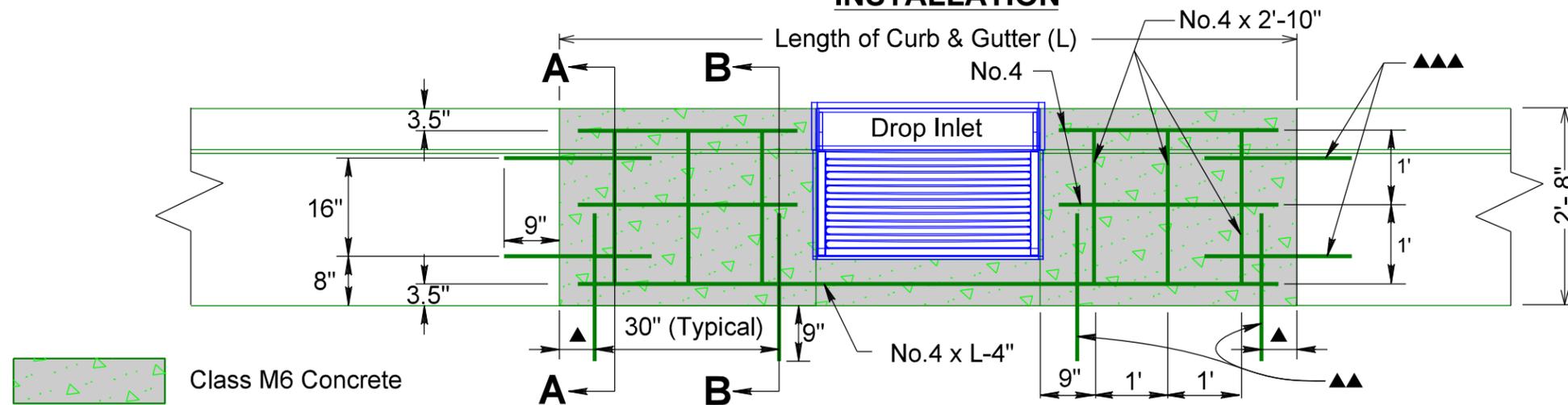
REMOVAL



 Remove Concrete Curb and/or Gutter

* If sawing is required, the cost will be incidental to the contract unit price per foot for Repair Concrete Curb and/or Gutter.

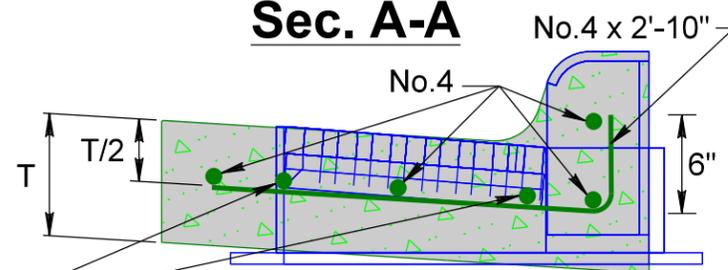
INSTALLATION



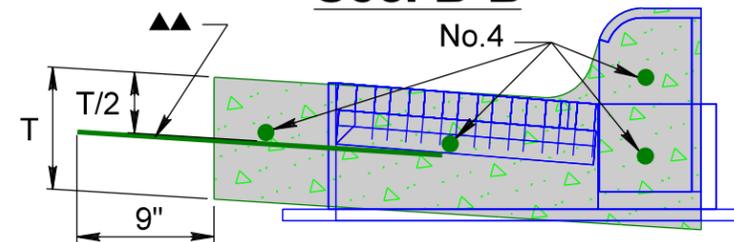
 Class M6 Concrete

- ▲ 9" Minimum
23" Maximum
- ▲▲ No. 5 x 24" Epoxy Coated Deformed Tie Bar Drilled 9" into in place pavement **
- ▲▲▲ No. 5 x 24" Epoxy Coated Deformed Tie Bar Drilled 9" into in place curb & gutter **

Sec. A-A



Sec. B-B



Maintain 2" clear cover on all rebar.

See standard plate for Type B Concrete Curb and Gutter for forming details.

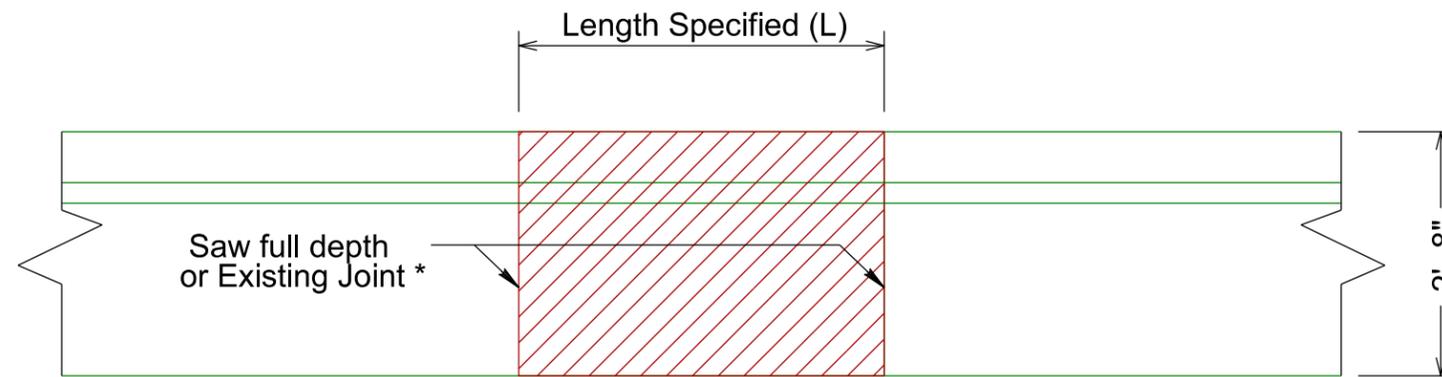
** Cost for this work will be included in the contract unit price per each for Insert Steel Bar in PCC Pavement.

REPAIR CONCRETE CURB AND/OR GUTTER

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	0009-271	37	47

Plotting Date: 03/30/2022

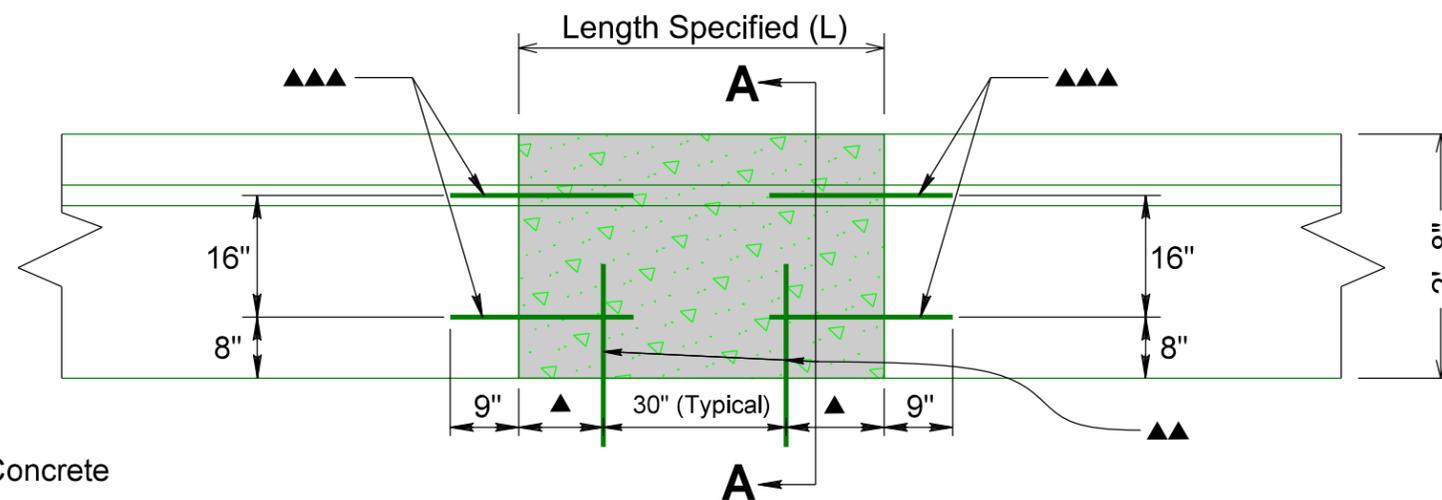
REMOVAL



 Remove Concrete Curb and/or Gutter

* If sawing is required, the cost will be incidental to the contract unit price per foot for Repair Concrete Curb and/or Gutter.

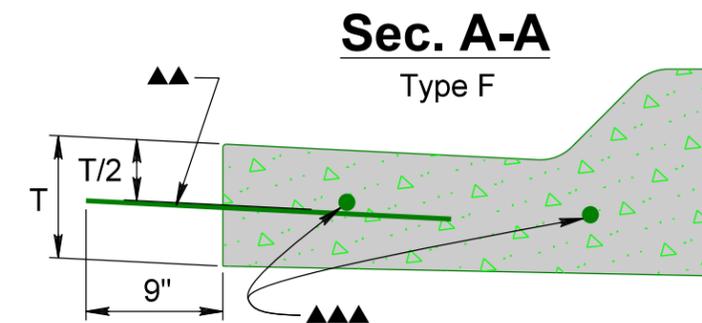
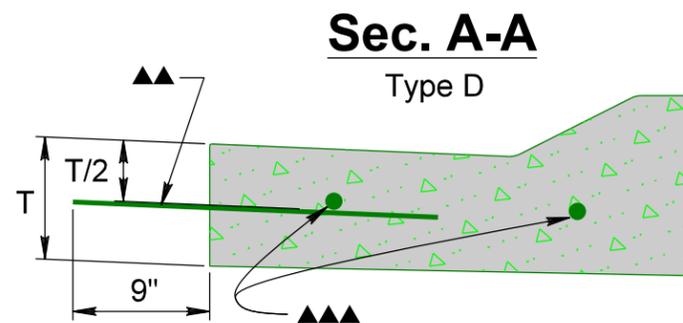
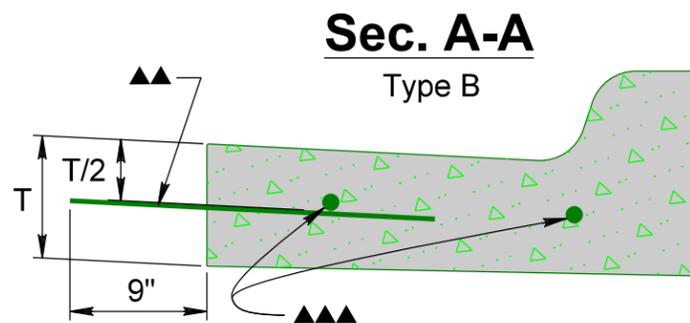
INSTALLATION



 Class M6 Concrete

- ▲ 9" Minimum
23" Maximum
- ▲▲ No. 5 x 24" Epoxy Coated Deformed Tie Bar Drilled 9" into in place pavement **
- ▲▲▲ No. 5 x 24" Epoxy Coated Deformed Tie Bar Drilled 9" into in place curb & gutter **

See standard plate(s) for Type B, D and F Concrete Curb and Gutter and Type P Concrete Gutter for construction and forming details.



** Cost for this work will be included in the contract unit price per each for Insert Steel Bar in PCC Pavement.

Maintain 2" clear cover on all rebar.

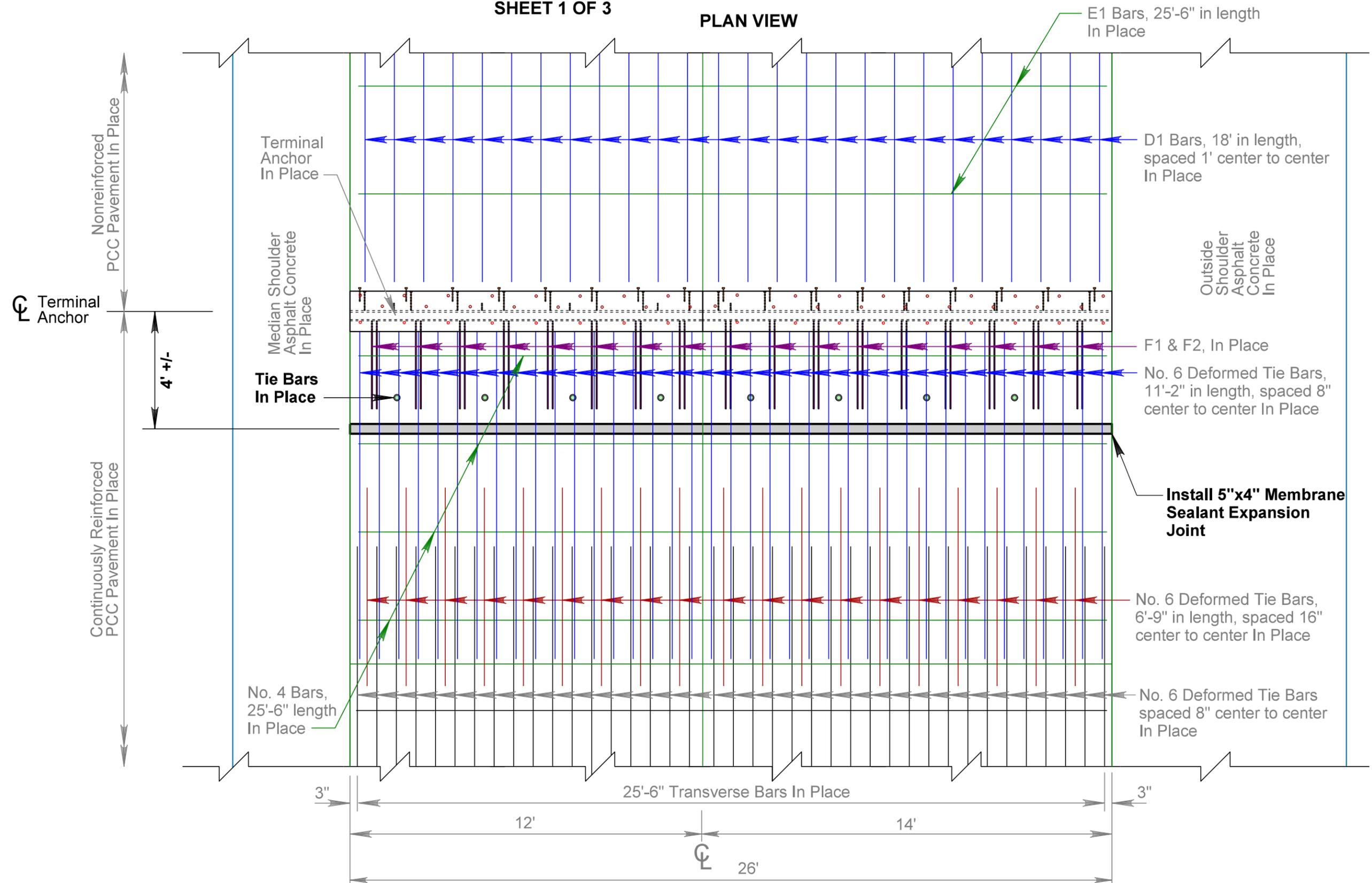
MEMBRANE SEALANT EXPANSION JOINT INSTALLATION AT IN PLACE PAVEMENT TERMINAL ANCHOR

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	0009-271	38	47

Plotting Date: 03/29/2022

SHEET 1 OF 3

PLAN VIEW



PLOT SCALE - 1/3, 33333

PLOTTED FROM - TRSF12105

FILE - ... \CRC TERMINAL SAWED IN MEMBRANE JOINT.DGN

PLOT NAME - 1

MEMBRANE SEALANT EXPANSION JOINT INSTALLATION AT IN PLACE PAVEMENT TERMINAL ANCHOR

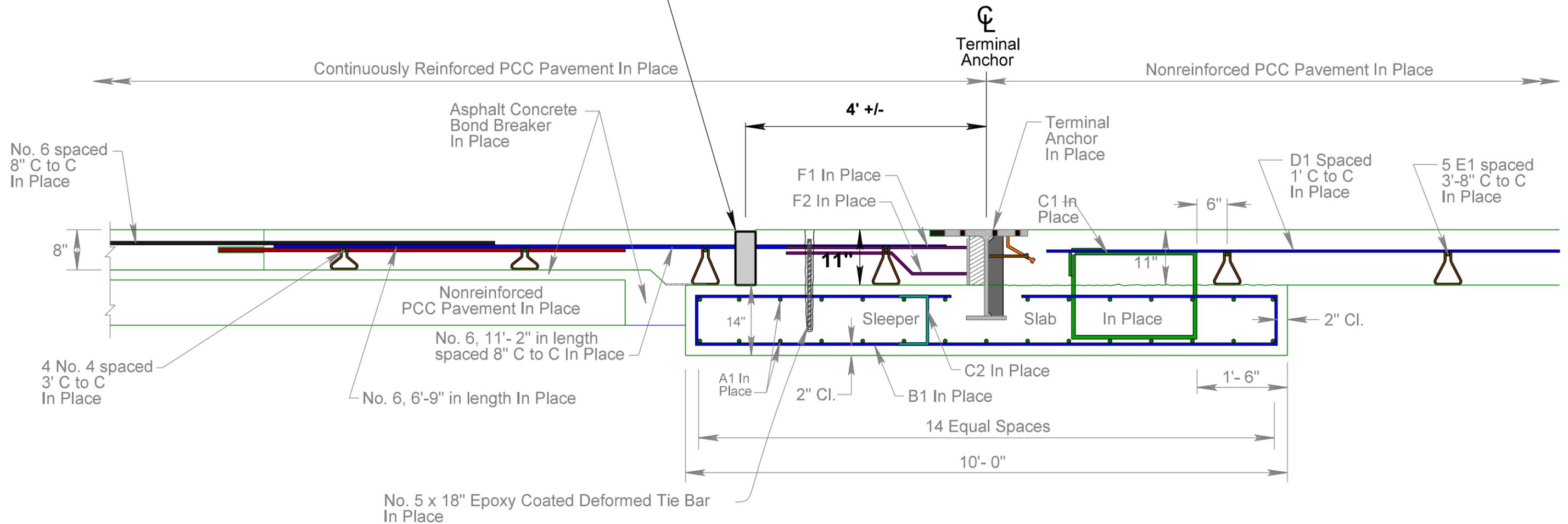
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	0009-271	39	47

Plotting Date: 03/29/2022

SHEET 2 OF 3

PROFILE VIEW

Saw Cut the CRC side of the existing joint location, remove 5" width, 11" depth of existing continuously reinforced concrete pavement and install Membrane Sealant Expansion Joint See DETAIL X on next sheet.



Cost for sawing, removing concrete, and installing the new joint including material, equipment and labor shall be incidental to the contract unit price per foot for Membrane Sealant Expansion Joint.

PLOT SCALE - 1:1.66667

PLOTTED FROM - TRSF12105

PLOT NAME - 2

FILE - ... \CRC TERMINAL SAWED IN MEMBRANE JOINT.DGN

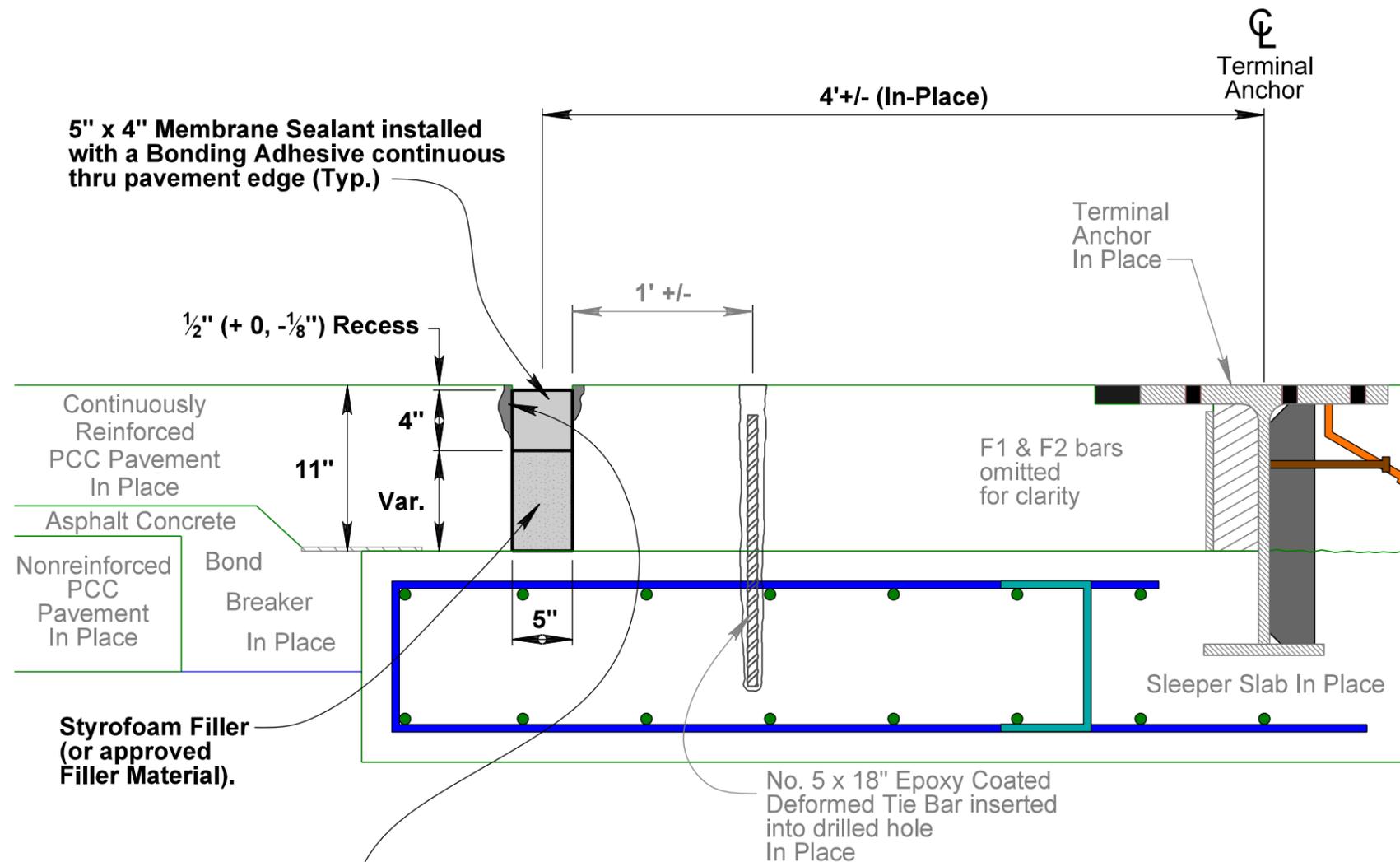
MEMBRANE SEALANT EXPANSION JOINT INSTALLATION AT IN PLACE PAVEMENT TERMINAL ANCHOR

SHEET 3 OF 3

STATE OF SOUTH DAKOTA	PROJECT 0009-271	SHEET 40	TOTAL SHEETS 47
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Plotting Date: 03/29/2022

DETAIL X



After sawing and removing concrete from between the saw cuts is complete, remove any loose/spalled concrete, as necessary, adjacent to the saw cuts on both sides of the joint.

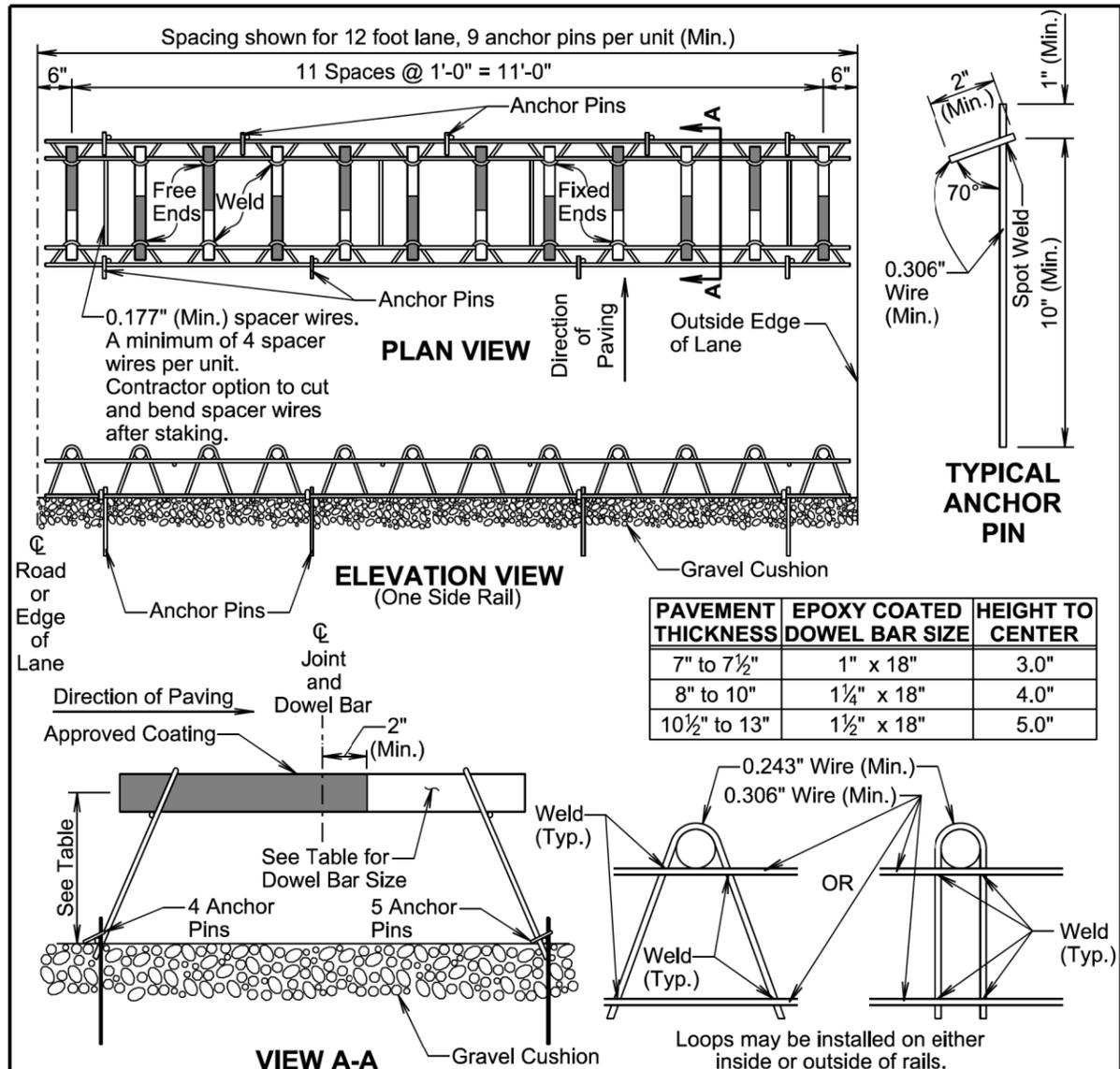
It may be necessary to make an additional saw cut on the Terminal Anchor side of the joint to satisfactorily remove all adhered expansion joint material and laitance.

Cost for removal of the loose/spalled concrete will be incidental to the contract unit price per foot for Membrane Sealant Expansion Joint.

Apply Joint Nosing Material to restore a uniform joint width.

GENERAL NOTES

1. The Membrane Sealant must be on the approved product list for Membrane Sealant Expansion Joints.
2. The manufacturer must supply the membrane sealant in packaging that precompresses the membrane sealant. The precompressed dimension will be as recommended by the sealant manufacturer, however, in no case will the precompressed dimension exceed 75% of the joint opening width. The foam sealant must be slowly self expanding to permit workers ample time to install the membrane sealant before the membrane sealant exceeds the joint opening width.
3. The membrane sealant will provide a water tight seal throughout a joint movement range of + 25% (minimum) from the specified joint opening dimension.
4. The membrane sealant must be supplied in pieces a minimum of 5 feet in length. The foam sealant must be ultra-violet and ozone resistant.
5. The bonding adhesive used to attach the membrane sealant to the adjacent concrete must be approved by the membrane sealant manufacturer.
6. Adhesive used to join adjacent pieces of the membrane sealant must be as recommended by the manufacturer.
7. If Styrofoam filler material is used in the construction, it must be closed cell and water-tight as approved by the Engineer.
8. The minimum concrete and air temperature at the time of joint installation and adhesive curing will be 40° F.
9. A technical representative of the membrane sealant manufacturer must be present at the jobsite during installation. The technical representative will be knowledgeable in the correct procedures for the preparation and installation of the joint material to ensure the Contractor installs the joint to the Manufacturers recommendations.
10. Surfaces that will be in contact with the membrane sealant must be thoroughly cleaned by abrasive blasting to remove all laitance and contaminants (such as oil, curing compounds, etc.) from the surface. At a minimum, two passes of abrasive blasting with the nozzle held at an angle to within 1 to 2 inches of the surface will be required. Cleaning of the surfaces with solvents, wire brushing, or grinding will not be permitted.
11. After abrasive blasting, but immediately prior to membrane joint installation, the entire joint contact surface must be air blasted. The air compressor used for joint cleaning must be equipped with trap devices capable of providing moisture-free and oil-free air at a recommended pressure of 90 psi. To obtain complete bonding with the adhesive, the adjacent surfaces must be dry and clean. The contact surfaces for the joint will be visually inspected by the Engineer immediately prior to joint installation to verify the surface is dry and clean.
12. Individual spliced sections will be installed as per the manufacturers' recommendations. The membrane joint sealant manufacturer must submit a detailed installation procedure to the Engineer at least 5 days prior to joint installation for his review.
13. Traffic will not be allowed on the joint until the bonding adhesive has had time to cure, as recommended by the manufacturer.
14. Use plywood or other material to protect concrete adjacent to the joint from spalling before any equipment is moved across the joint. Any spall areas will be repaired at the Contractor's expense by breaking out and replacing adjacent concrete, as approved by the Engineer.
15. The Membrane Sealant Expansion Joint will be measured in feet to the nearest one-tenth foot, complete in place. Measurement will be made of the overall horizontal length. The Membrane Sealant Expansion Joint will be paid for at the contract unit price per foot complete in place. Payment for this item will be full compensation for furnishing all the required materials in place, including labor, equipment and incidentals necessary to complete the work in accordance with the plans and the foregoing specifications.



GENERAL NOTES:

Longitudinal joint tie bars will be placed a minimum of 15 inches from the transverse contraction joint.

Centerline of individual dowel bars will be parallel to top of subgrade $\pm 1/8$ inch in 18 inches and to all other dowel bars in the assembly $\pm 1/16$ inch in 18 inches.

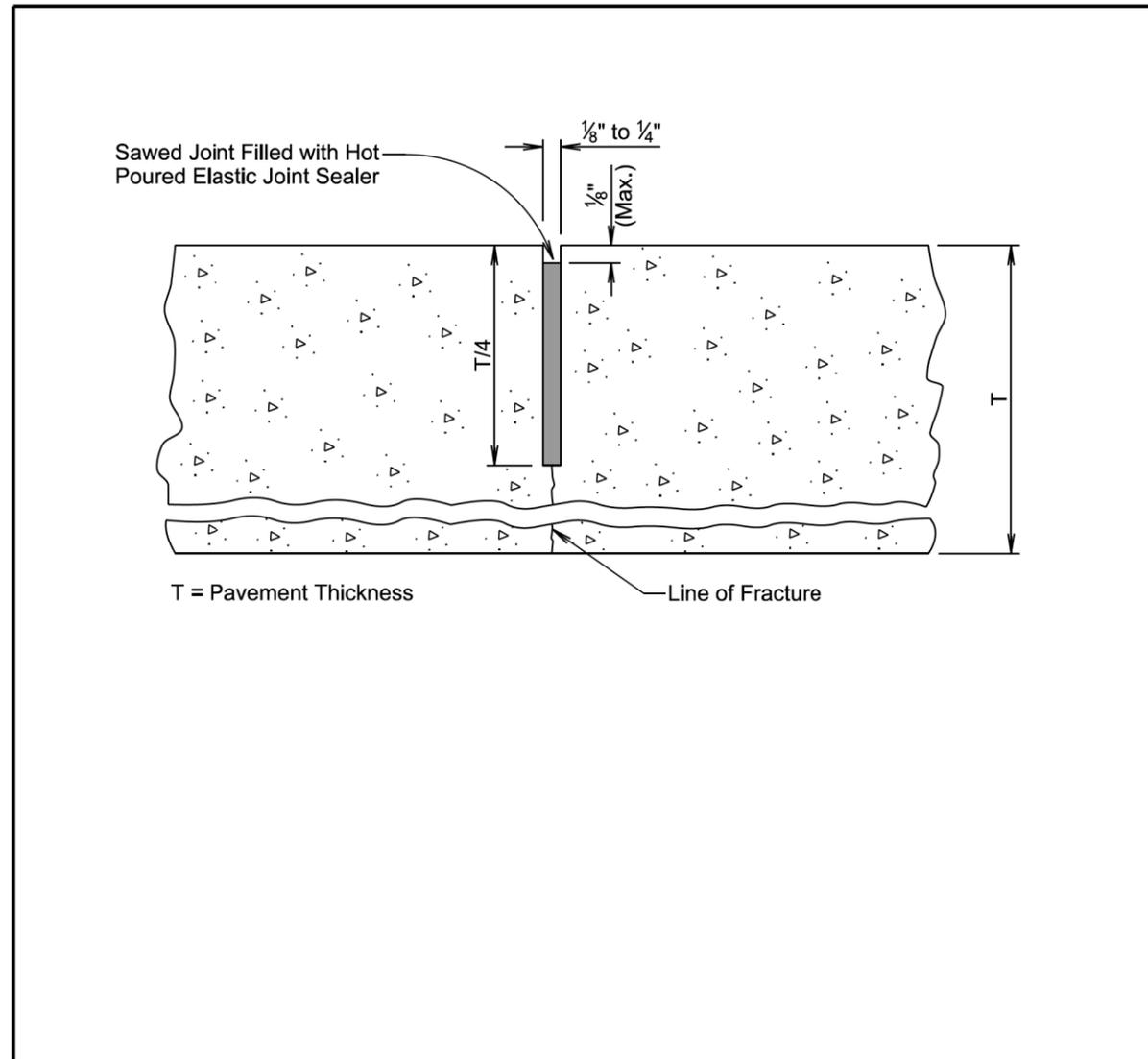
Centerline of individual dowel bars will be parallel to the centerline of the roadway $\pm 1/2$ inch in 18 inches.

The transverse contraction joints will be sawed perpendicular to the centerline of the roadway and the dowel bars will be centered on the sawed joint ± 1 inch.

Supporting devices as shown on this sheet, or equivalent as approved by the Engineer, will be used to maintain proper horizontal and vertical alignment of the dowel bars.

June 26, 2019

S D D O T	PCC PAVEMENT DOWEL BAR ASSEMBLY FOR TRANSVERSE CONTRACTION JOINTS 12 Bar Assembly on Granular Base Material	PLATE NUMBER 380.01
	Published Date: 1st Qtr. 2022	Sheet 1 of 1



GENERAL NOTES:

If an early entrance saw cut does not develop the full transverse crack, then the saw cut to control cracking will be a minimum $1/4$ of the thickness of the pavement.

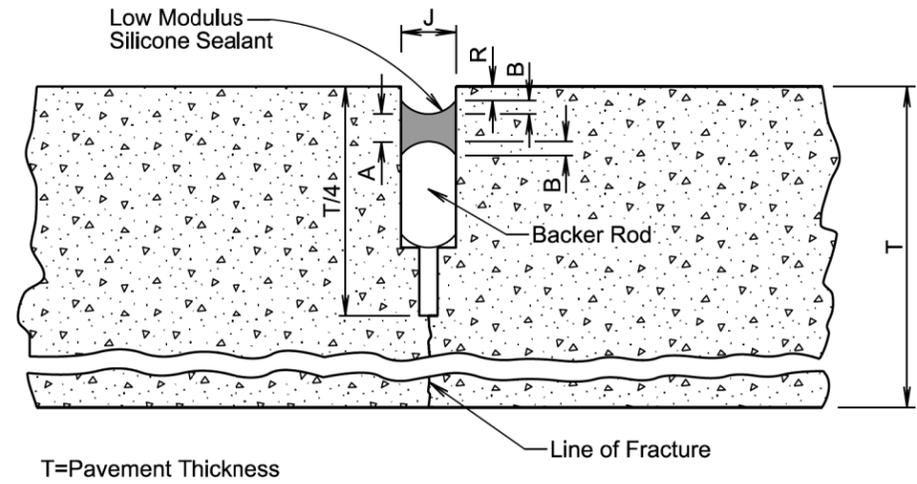
All hot poured elastic joint sealer material spilled on the surface of the concrete pavement will be removed as soon as the material has cooled. The extent of removal of material will be to the satisfaction of the Engineer. All costs for removal of the spilled joint sealer material will be borne by the Contractor.

S D D O T	PCC PAVEMENT TRANSVERSE CONTRACTION JOINT WITH OR WITHOUT DOWEL BAR ASSEMBLY	PLATE NUMBER 380.05
	Published Date: 1st Qtr. 2022	Sheet 1 of 1

Plot Scale - 1:200

Plotted From - TRSF12105

File - ...STD Plates (6LU).dgn



T=Pavement Thickness

LOW MODULUS SILICONE SEALANT ALLOWABLE CONSTRUCTION TOLERANCES				
J=3/8"				
A (Min.) (in.)	A (Max.) (in.)	B (Min.) (in.)	B (Max.) (in.)	R (in.)
3/16	5/16	1/8	1/4	1/4
J=1/2"				
A (Min.) (in.)	A (Max.) (in.)	B (Min.) (in.)	B (Max.) (in.)	R (in.)
3/16	3/8	1/8	1/4	1/4
J=5/8"				
A (Min.) (in.)	A (Max.) (in.)	B (Min.) (in.)	B (Max.) (in.)	R (in.)
1/4	7/16	1/8	5/16	1/4
J=3/4"				
A (Min.) (in.)	A (Max.) (in.)	B (Min.) (in.)	B (Max.) (in.)	R (in.)
5/16	1/2	3/16	3/8	5/16
J=1"				
A (Min.) (in.)	A (Max.) (in.)	B (Min.) (in.)	B (Max.) (in.)	R (in.)
3/8	5/8	3/16	1/2	5/16

GENERAL NOTE:

The backer rod will be a nonmoisture absorbing resilient material approximately 25% larger in diameter than the width of the joint to be sealed.

June 26, 2019

S D D O T	RESEAL PCC PAVEMENT JOINT (SILICONE)	PLATE NUMBER 380.13
	Published Date: 1st Qtr. 2022	Sheet 1 of 1

Plot Scale - 1:200

Plotted From - TRSE12105

File - ...STD Plates 16LU.dgn

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)	Spacing of Channelizing Devices (Feet) (G)
0 - 30	200	25
35 - 40	350	25
45	500	25
50	500	50
55	750	50
60 - 65	1000	50

- Flagger
- Channelizing Device

For low-volume traffic situations with short work zones on straight roadways where the flagger is visible to road users approaching from both directions, a single flagger may be used.

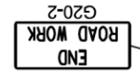
The ROAD WORK AHEAD and the END ROAD WORK signs may be omitted for short duration operations (1 hour or less).

For tack and/or flush seal operations, when flaggers are not being used, the FRESH OIL sign (W21-2) will be displayed in advance of the liquid asphalt areas.

Flashing warning lights and/or flags may be used to call attention to the advance warning signs.

The channelizing devices will be drums or 42" cones.

Channelizing devices are not required along the centerline adjacent to work area when pilot cars are utilized for escorting traffic through the work area.

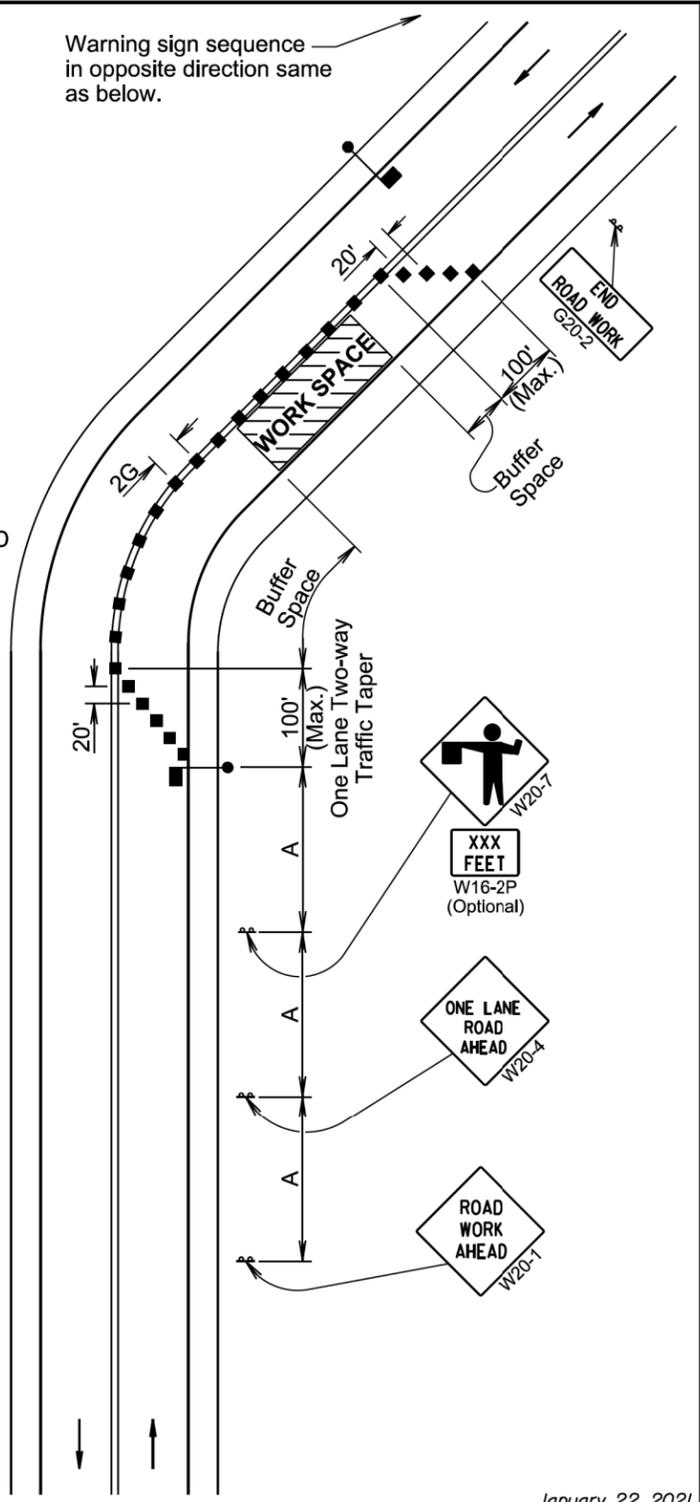


Channelizing devices and flaggers will be used at intersecting roads to control intersecting road traffic as required.

The buffer space should be extended so that the two-way traffic taper is placed before a horizontal or vertical curve to provide adequate sight distance for the flagger and queue of stopped vehicles.

The length of A may be adjusted to fit field conditions.

Warning sign sequence in opposite direction same as below.

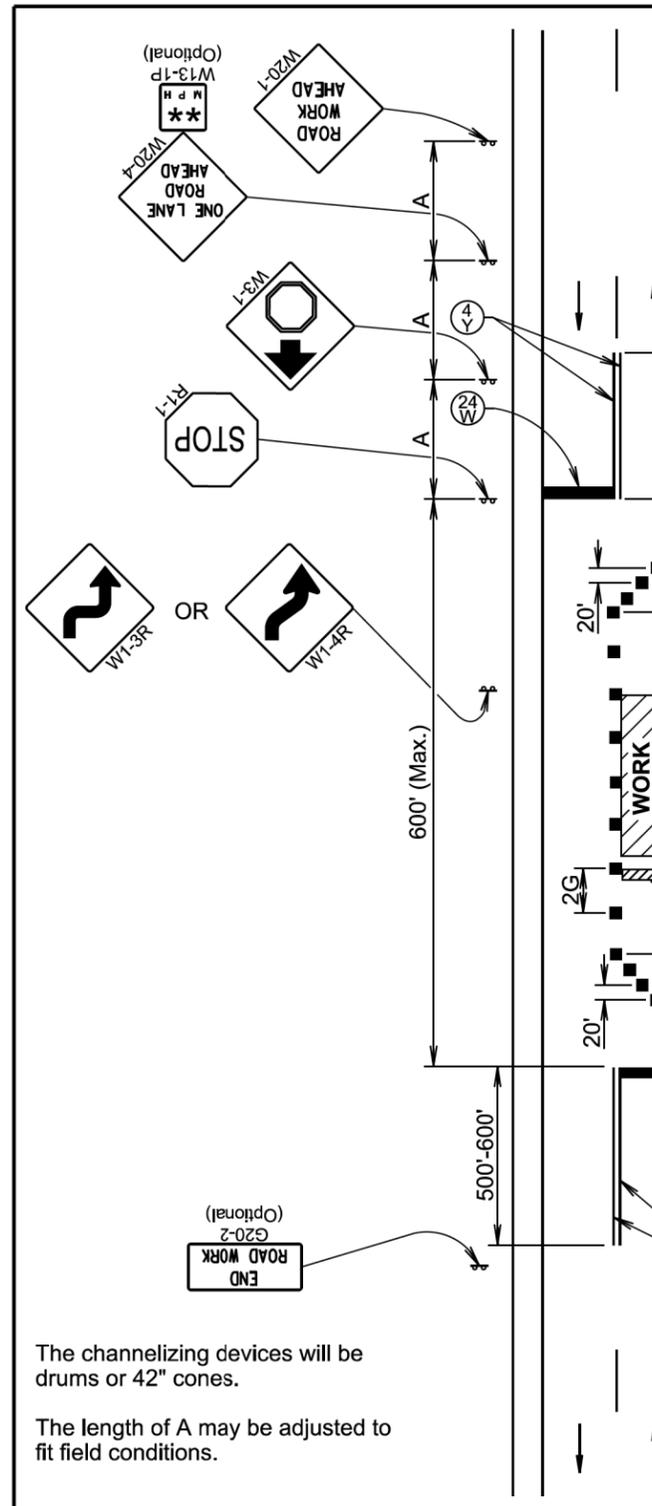


January 22, 2021

S D D O T	LANE CLOSURE WITH FLAGGER PROVIDED	PLATE NUMBER 634.23
	<i>Published Date: 1st Qtr. 2022</i>	Sheet 1 of 1

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)	Taper Length (Feet) (L)	Spacing of Channelizing Devices (Feet) (G)
0 - 30	200	180	25
35 - 40	350	320	25
45	500	600	25
50	500	600	50
55	750	660	50
60 - 65	1000	780	50

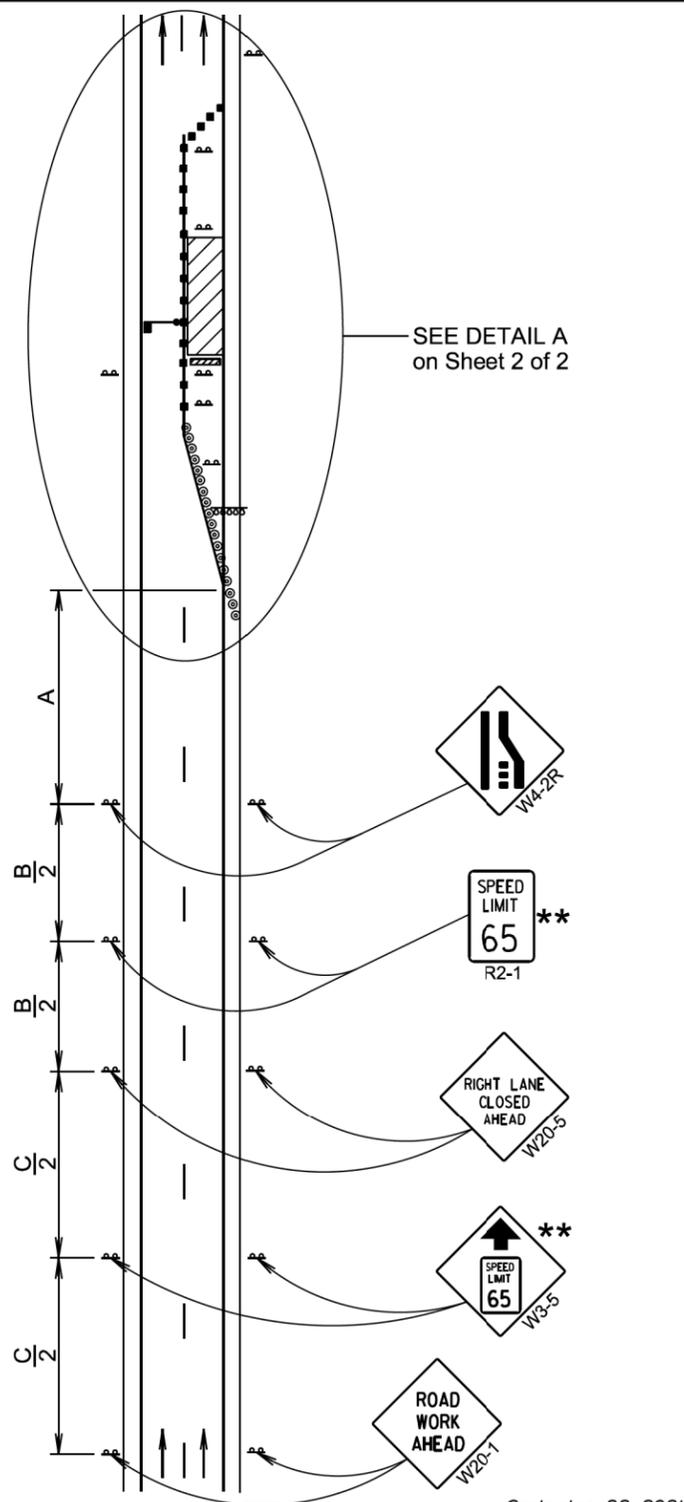
- Ⓜ 24" White Temporary Pavement Marking
- Ⓞ 4" Yellow Temporary Pavement Marking
- Channelizing Device
- ** Need and safe speed to be determined at the site by the Engineer.



January 22, 2021

S D D O T	LANE CLOSURE USING STOP SIGNS	PLATE NUMBER 634.25
	<i>Published Date: 1st Qtr. 2022</i>	Sheet 1 of 1

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet)		
	(A)	(B)	(C)
0 - 30	200		
35 - 40	350		
45 - 50	500		
55	750		
60 - 65	1000		
70 - 80	1000	1500	2640



** Speed appropriate for location.

- ⊙ Reflectorized Drum
- Channelizing Device

ROAD WORK AHEAD sign is only required in advance of the first lane closure.

High speed is defined as having a posted speed limit greater than 45 mph.

September 22, 2021

S D D O T	WORK ZONE SPEED REDUCTION FOR INTERSTATE AND HIGH SPEED MULTI-LANE HIGHWAYS	PLATE NUMBER 634.63
	<i>Published Date: 1st Qtr. 2022</i>	Sheet 1 of 2

Posted Speed Prior to Work (M.P.H.)	Spacing of Channelizing Devices (Feet) (G)	Taper Length (Feet) (L)
0 - 30	25	180
35 - 40	25	320
45	25	600
50	50 *	600
55	50 *	660
60 - 65	50 *	780
70 - 80	50 *	960

* Spacing is 40' for 42" cones.

** Speed appropriate for location.

*** Use speed limit designated for the condition when workers are present in the work space. Signs will be covered or removed when workers are not present.

Flagger (As Necessary)

⊙ Reflectorized Drum

■ Channelizing Device

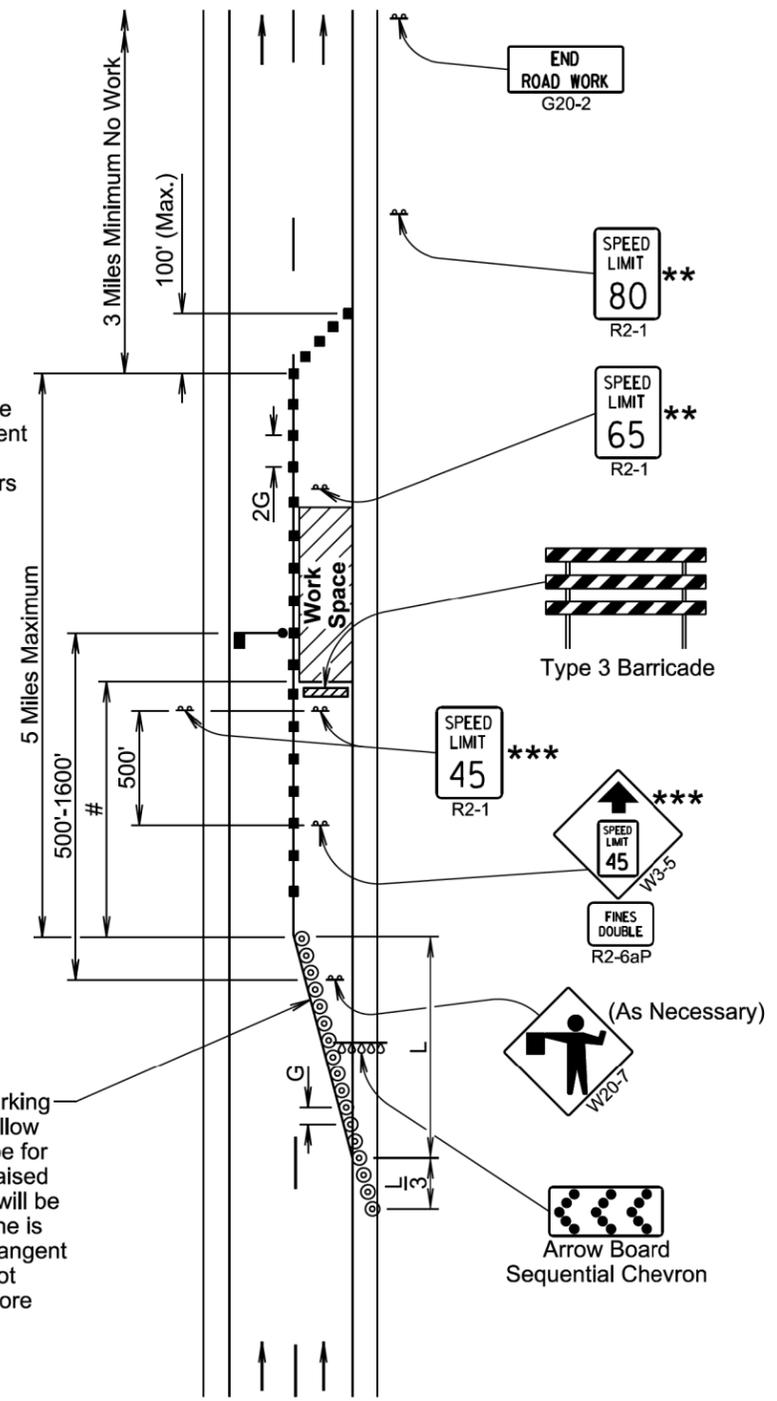
The Work Space will be a minimum of 500' from the end of the taper.

The FLAGGER sign will be used whenever there is a Flagger present.

The channelizing devices will be 42" cones or drums.

42" cones may be used in place of the drums shown in the taper if setup will not be used during night time hours.

4" white temporary pavement marking tape for right lane closures, 4" yellow temporary pavement marking tape for left lane closures, or temporary raised pavement markers at 5' spacing will be installed in the taper when the lane is closed overnight, and along the tangent section where the skip lines do not exist and the lane is closed for more than 3 days.

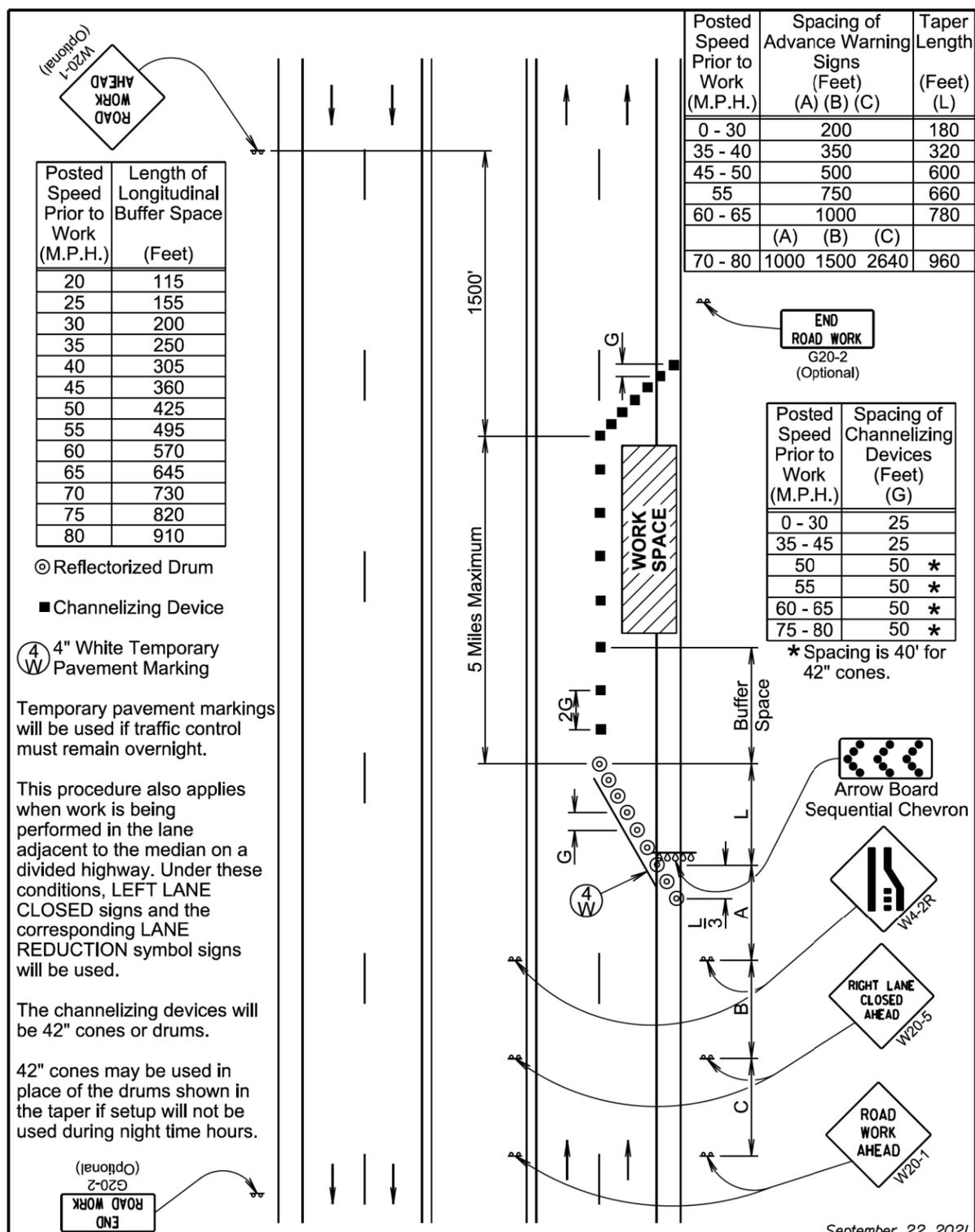


DETAIL A

September 22, 2021

S D D O T	WORK ZONE SPEED REDUCTION FOR INTERSTATE AND HIGH SPEED MULTI-LANE HIGHWAYS	PLATE NUMBER 634.63
	<i>Published Date: 1st Qtr. 2022</i>	Sheet 2 of 2

Plot Scale - 1:200



Posted Speed Prior to Work (M.P.H.)	Length of Longitudinal Buffer Space (Feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820
80	910

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet)			Taper Length (Feet) (L)
	(A)	(B)	(C)	
0 - 30	200			180
35 - 40	350			320
45 - 50	500			600
55	750			660
60 - 65	1000			780
	(A)	(B)	(C)	
70 - 80	1000	1500	2640	960

Posted Speed Prior to Work (M.P.H.)	Spacing of Channelizing Devices (Feet) (G)
0 - 30	25
35 - 45	25
50	50 *
55	50 *
60 - 65	50 *
75 - 80	50 *

* Spacing is 40' for 42" cones.

- ⊙ ReflectORIZED Drum
- Channelizing Device
- ④ W 4" White Temporary Pavement Marking

Temporary pavement markings will be used if traffic control must remain overnight.

This procedure also applies when work is being performed in the lane adjacent to the median on a divided highway. Under these conditions, LEFT LANE CLOSED signs and the corresponding LANE REDUCTION symbol signs will be used.

The channelizing devices will be 42" cones or drums.

42" cones may be used in place of the drums shown in the taper if setup will not be used during night time hours.

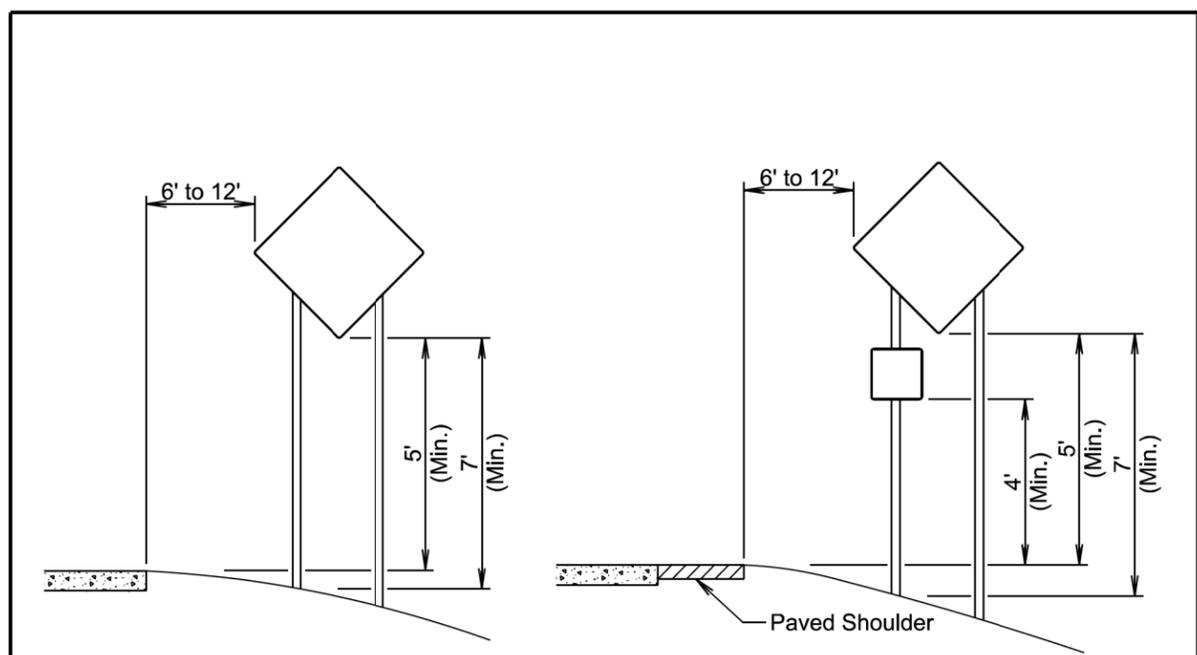
(Optional)
G20-2
END ROAD WORK

September 22, 2021

S D D O T	LANE CLOSURE WITHOUT BARRIER	PLATE NUMBER 634.64
	Published Date: 1st Qtr. 2022	Sheet 1 of 1

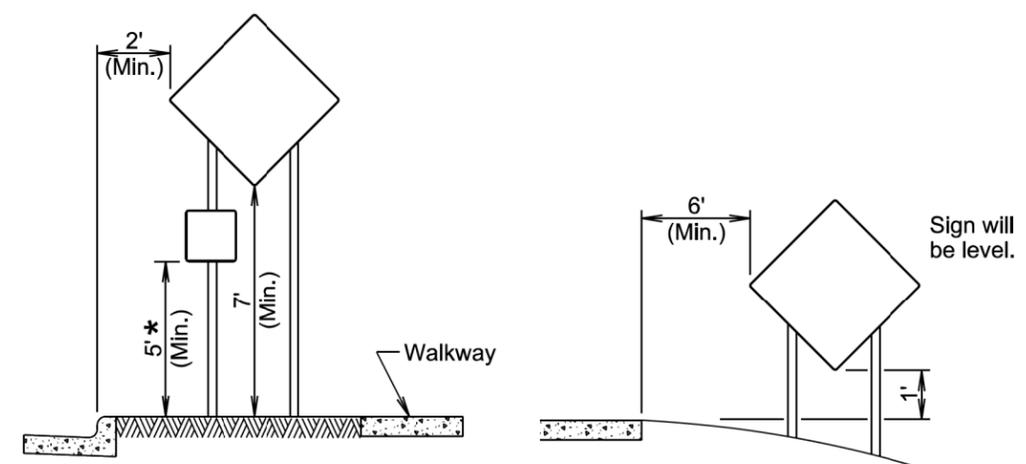
File - ...STD Plates (6LU).dgn

Plot Scale - 1:200



RURAL DISTRICT

RURAL DISTRICT WITH SUPPLEMENTAL PLATE



URBAN DISTRICT

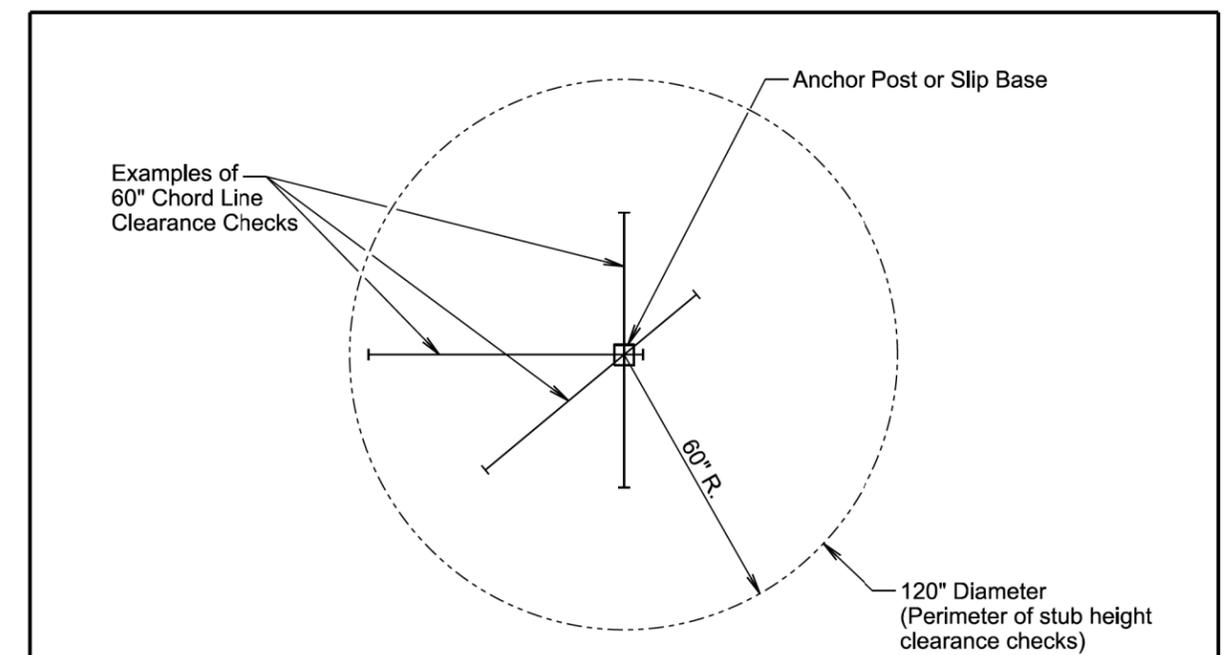
RURAL DISTRICT 3 DAY MAXIMUM
(Not applicable to regulatory signs)

* If the bottom of supplemental plate is mounted lower than 7 feet above a pedestrian walkway, the supplemental plate should not project more than 4" into the pedestrian facility.

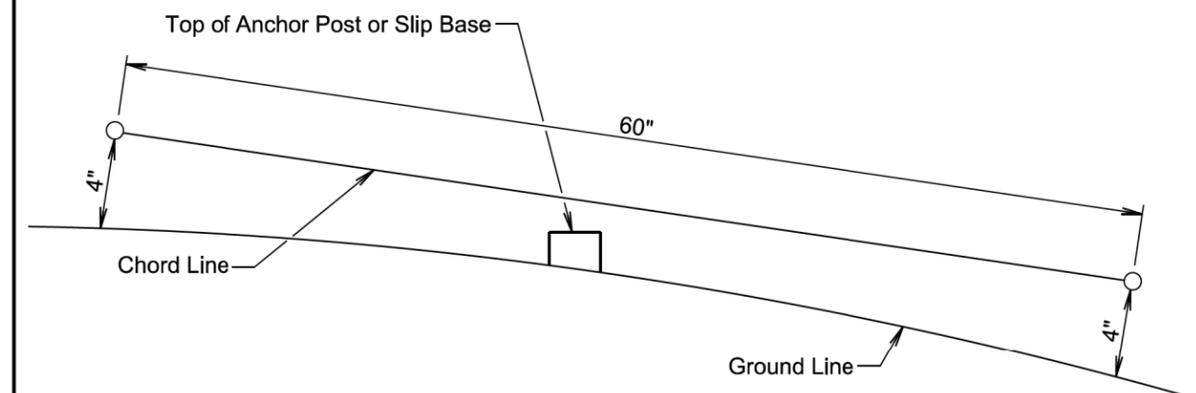
January 22, 2021

S D D O T	CRASHWORTHY SIGN SUPPORTS (Typical Construction Signing)	PLATE NUMBER 634.85
		Sheet 1 of 1

Published Date: 1st Qtr. 2022



PLAN VIEW
(Examples of stub height clearance checks)



ELEVATION VIEW

GENERAL NOTES:

- The top of anchor posts and slip bases WILL NOT extend above a 60" chord line within a 120" diameter circle around the post with ends 4" above the ground.
- At locations where there is curb and gutter adjacent to the breakaway sign support, the stub height will be a maximum of 4" above the ground line at the localized area adjacent to the breakaway support stub.
- The 4" stub height clearance is not necessary for U-channel lap splices where the support is designed to yield (bend) at the base.

January 22, 2021

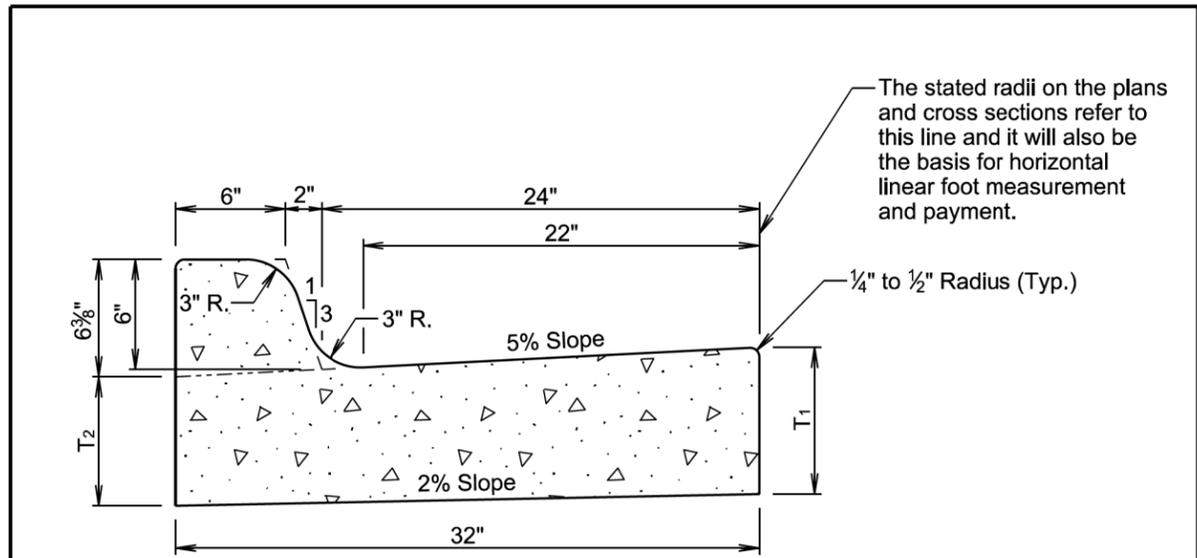
S D D O T	BREAKAWAY SUPPORT STUB CLEARANCE	PLATE NUMBER 634.99
		Sheet 1 of 1

Published Date: 1st Qtr. 2022

File - ...STD Plates 16LU.dgn

- Plotted From - TRSF12105

Plot Scale - 1:200



The stated radii on the plans and cross sections refer to this line and it will also be the basis for horizontal linear foot measurement and payment.

1/4" to 1/2" Radius (Typ.)

TYPE B CONCRETE CURB AND GUTTER

Type	T ₁ (Inches)	T ₂ (Inches)	Cu. Yd. Per Lin. Ft.	Lin. Ft. Per Cu. Yd.
B66	6	5 1/16	0.057	17.7
B67	7	6 1/16	0.065	15.4
B68	8	7 1/16	0.073	13.7
B68.5	8.5	7 9/16	0.077	13.0
B69	9	8 1/16	0.081	12.3
B69.5	9.5	8 9/16	0.085	11.7
B610	10	9 1/16	0.090	11.2
B610.5	10.5	9 9/16	0.094	10.7
B611	11	10 1/16	0.098	10.2
B611.5	11.5	10 9/16	0.102	9.8
B612	12	11 1/16	0.106	9.4

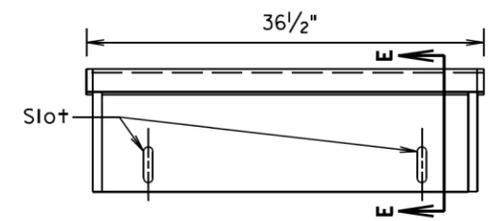
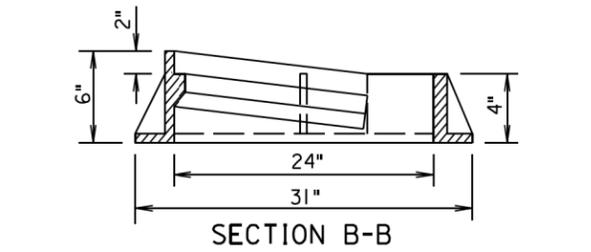
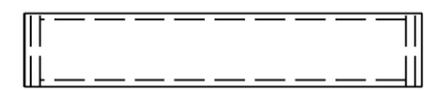
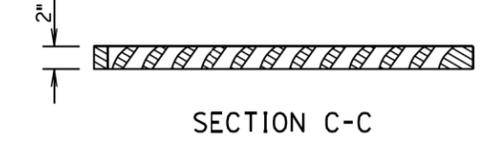
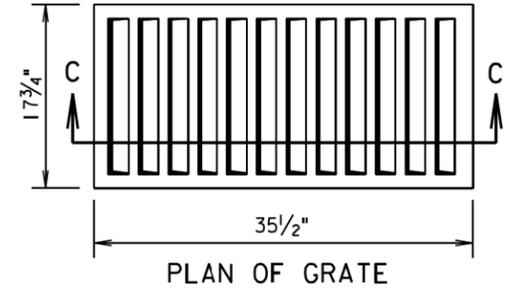
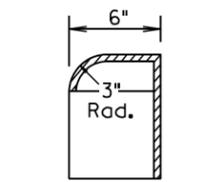
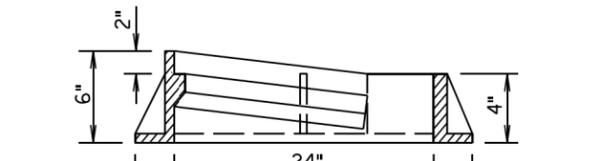
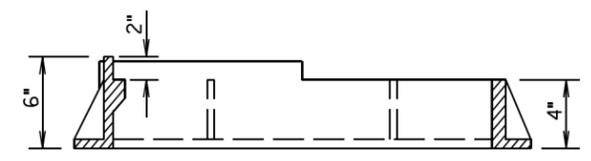
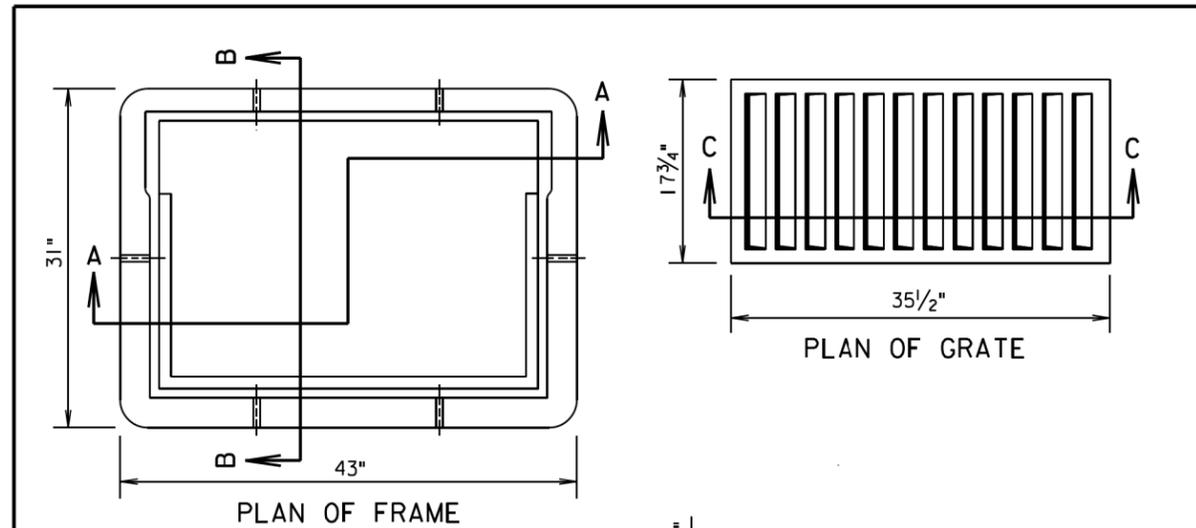
GENERAL NOTES:

When concrete curb and gutter longitudinally adjoins new concrete pavement, the method of attachment will be by one of the methods shown on standard plate 380.11.

See standard plate 650.90 for expansion and contraction joints in the curb and gutter.

December 23, 2019

S D D O T	TYPE B CONCRETE CURB AND GUTTER	PLATE NUMBER 650.01
	Published Date: 1st Qtr. 2022	Sheet 1 of 1



GENERAL NOTE:

Total weight of the assembly shall be 490 Lbs. minimum and the curb box shall be adjustable 6" to 9".

March 31, 2000

S D D O T	TYPE B FRAME AND GRATE ASSEMBLY	PLATE NUMBER 670.80
	Published Date: 1st Qtr. 2022	Sheet 1 of 1

-Plotted From- TRSF12105

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